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ABSTRACT

Cuyahoga Community College's (CCC) Unified Technologies Center (UTC) collaborated with three Cleveland area manufacturing companies in a workplace literacy project. The project provided job-related mathematics and communications programs for 302 employees who needed basic skills upgrading to improve their job performance. The project implementation process involved the following: establishment of an operations/advisory committee; information meetings; instructor selection; basic skills job/task analysis; employee assessment; advising sessions; curriculum design/development; train-the-trainer/instructor orientation; establishment of a multimedia learning center; training; and evaluation activities. Four courses were designed and developed for each company: Mathematics on the Job I and II and Communications on the Job I and II. The objectives for each course differed from company to company, based on the job task analysis and the mathematics and communications requirements of each job. (The 18-page report is accompanied by extensive attachments, including the following: copies of the job task analysis for each of the three partner companies; examples of test results given to each company; samples of the Individual Learning Plan; a course description and general outline for each course; samples of criterion-referenced assessments; reports compiled from student evaluation forms completed at the end of each course; and a final evaluation report.) (YLB)

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RESULTS ORIENTATED WORKPLACE LITERACY PROJECT

Presented to:
U.S. Department of Education
National Workplace Literacy Program

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NATIONAL WORKPLACE LITERACY PROGRAM QUANTITATIVE INFORMATION

PROJECT PERIOD: MAY, 1992 - OCTOBER, 1993

1. Target Number To Be Served: 302

2. Total Number Served: 320

3. Total Number Served: Company Breakdown

Company Name	Planned	Actual
American Steel and Wire	70	0[1]
Cleveland Wood Products	60	76
TRW, Inc., Valve Division	72	151
Zircoa, Incorporated	100	93
TOTAL	302	320

4. Jobs Analyzed at Each Site

Company Name	Jobs
Cleveland Wood Products	Machine Operator, Brush Operator, Brush Assembler
TRW, Inc., Valve Division	Automation Operator, Heavy Duty Machine Operator, Visual and Floor Inspector
Zircoa, Incorporated	BGM Operator, Fine Grain Batch Mixer, Grain Plant Operator/Shift Leader, Kiln Operator/Loader, Machinist Class "A", Maintenance Tradesworker, Packer Inspector Loader, Press Operator, Slipcaster/Slipcast Specialist.

5. Federal Funds Allocated: $270,120
Federal Funds Used: $

6. Matching Funds / In-Kind Planned: $128,140
Matching Funds / In-Kind Actual: $300, 640 (includes value of worker release time)

7. Value Worker Release Time: $192,000

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[1] American Steel and Wire did not participate as a grant partner due to conflict of interest with another Cleveland area training provider. The number of participants planned to be served at American Steel and Wire was divided among the remaining three partner companies.

8. Sections of Each Course Provided (twenty hours each):

Mathematics-on-the Job I	17
Mathematics-on-the-Job II	16
Communications-on-the-Job I	11
Communications-on-the-Job II	13
Communications-on-the-Job III [2]	6
Total Sections:	63

9. Total Instructional Hours: 1,260 (63 sections X 20 hrs.)

10. Total Training Hours (for 320 participants) 12,800 (320 participants X 40 hrs.)

11. Participant Data:

a. Age of Participants

Age of Participants	# of participants	% of total
16-20 years	4	1.2
21-30	32	10.1
31-39	96	30.0
40-49	94	29.4
50-60	67	20.9
Over 60	27	8.4

b. Sex:

Sex:	# of participants	% of total
1. Number of Males	243	76
2. Number of Females	77	24

c. Race/Ethnicity:

Race/Ethnicity:	# of participants	% of total
1. White	228	71.3
2. Black	36	11.1
3. Hispanic	48	15.0
4. American Indian / Alaska Native	2	2.1
5. Asian/Pacific Islander	6	.5

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[2] This course was provided for those Zircoa employees who did not have a basic skills need, i.e. who scored above 12.9 grade equivalent on the English Comprehension and Vocabulary sections of the TABE. After assessing Zircoa Inc.'s entire employee base, there were far fewer employees who needed the basic skills training planned for this grant. However, the company requested appropriate training for this group.

d. Number of Participants with English as Second Language: 12

e. Number of years employed with partner Company:

		# of participants	% of total
1.	1-10 years	198	62.0
2.	11-20 years	88	27.4
3.	21-30 years	33	10.3
4.	31-40 years	0	0
5.	41-50 years	1	.3

f. Outcomes

1. Standardized Test of Adult Basic Education (TABE)

Significant improvement was shown if the following areas:

Reading percentage	+7.18
Reading stanine level	+0.58
Reading grade equivalent	+0.56
Math standard score	+12.42
Math percentage	+6.18
Math stanine level	+0.53
Math grade equivalent	+0.76

2. Tested Higher on Standardized Test of Applied Literacy Skills (TALS)

Group sample was too small to show significant changes.

3. Criterion-Referenced Tests

Significant change occurred in both classes:

First class	+24.69
Second class	+29.45

NATIONAL WORKPLACE LITERACY PROJECT

PROJECT PERIOD: MAY 1992 THROUGH JUNE 1993

FINAL REPORT

I. INTRODUCTION

Cuyahoga Community College's (CCC) Unified Technologies Center (UTC) has partnered with three Cleveland area manufacturing companies, Cleveland Wood Products, TRW., Inc., Valve Division, and Zircoa, Incorporated in this workplace literacy project. The goal of the project was to provide job-related mathematics and communications programs for 302 employees who needed basic skills upgrading in order to better perform their jobs. All project objectives and timelines were achieved as anticipated.

II. PARTICIPANT COMPANIES

Originally there were four companies that partnered CCC/UTC: American Steel & Wire, Cleveland Wood Products, TRW, Inc., Valve Division and Zircoa, Inc. American Steel & Wire withdrew from the project early in the project because of a conflict of interest with another training provider. A letter of withdrawal was sent to the Department of Education by American Steel and Wire.

III. PROJECT IMPLEMENTATION PROCESS

The implementation of the National Workplace Literacy Project at each of the partner companies followed a systematic process. Individual differences in company policies, procedures, culture, and style, caused slight variations in the process. In general, the project work conducted at the partner's sites was carried out consecutively. The following is the general process, followed at all companies. Variations are detailed in the company-by-company report later in this document.

A. Establish Operations/Advisory Committee
B. Conduct Information Meetings
C. Select Instructors
D. Conduct Basic Skills Job/Task Analysis
E. Conduct Employee Assessment
F. Conduct Advising Sessions
G. Design/Develop Curriculum
H. Conduct Train-the-Trainer/Instructor Orientation
I. Set up Multi-Media Learning Center
J. Schedule/Conduct Training
K. Conduct Evaluation Activities

A. ESTABLISH OPERATIONS/ADVISORY COMMITTEE

The basic process followed at each of the companies for delivery of the grant included the formation of a training operations/advisory team ideally comprised of a cross-section of organizational levels (upper management, supervisory, union management, and hourly). The function of this team was to assist UTC in marketing the program throughout the company, scheduling assessments and training sessions, identifying and confirming critical job tasks, and reviewing curriculum. Representatives from CCC/UTC's project team along with the membership of the operations/advisory team guided each company through the assessment, delivery and evaluation phases of the project.

B. CONDUCT INFORMATION MEETINGS

Prior to beginning the delivery of services at each company, UTC staff conducted information sessions at each of the partner sites. These sessions, scheduled on each of three shifts, were designed to establish trust and to familiarize potential participants with the project. Sessions included information on:

- employee assessment
- design, development, delivery of training
- job task analysis
- advising sessions
- evaluation

Time was allotted at the end of each information session to answer participant questions about the program.

C. SELECT INSTRUCTORS

The identification, selection and confirmation of qualified instructors is critical to the success of this project. Qualified instructors must be able to:

- understand instructional goals of program, i.e., improved performance on job-specific reading tasks
- administer and interpret pretest results and develop individualized education plans for participants
- effectively utilize functionally contextual (job) materials to teach basic skills for information processing
- successfully model the thinking strategies used in job reading task procedures
- conduct whole group instruction, emphasizing discussion and eliciting input from participants (rather than lecture)
- conduct instruction with several small groups of three to five participants simultaneously, to foster teamwork and interaction which transfers to the job
- design and monitor highly motivational individual instruction to maintain participants' interest and performance levels during independent activities
- develop rapport with employees and demonstrate effective classroom management, maintaining high levels of time on task and increases in performance
- demonstrate flexibility, fine tuning instructional goals

D. CONDUCT BASIC SKILLS JOB/TASK ANALYSIS

Each company selected job areas to be analyzed. The process used to analyze the basic skills levels needed to perform these jobs included the following steps:

- Interview "master performers" of each job

  These are individuals who perform the job in an exemplary manner - in a way the company ideally would wanted all employees to perform that job.

- Observe "master performers" doing the job

  Videotaping the master performer as he/she performed the critical functions of the job proved to be a very effective means of capturing the process for future reference.

- Gather job-related documents

  All documents, manuals, standard operating procedures, charts, forms, and graphs were collected and integrated into the course materials. Photographs of equipment, gages, micrometers, etc. were scanned into course materials. Interviews and observations were carried out when possible by the CCC/UTC course developer and/or the instructors. A comprehensive review of the job-related documents resulted in a determination of reading level required to perform the job. Based upon the interview, observations, and document analysis, similar determinations were made about mathematics and computation levels required to effectively perform the jobs.

The outcome from the job/task analysis included the basic skills levels in mathematics (computation and problem solving) and communications (written and verbal) required for competent performance of each job.

Copies of the Job/Task Analysis Reports for each company are included in Attachment A.

E. CONDUCT EMPLOYEE ASSESSMENT

Employees were assessed to determine their current level of knowledge and skill in the areas of mathematics and communications.

- Test of Adult Basic Education (TABE)

  CCC/UTC staff used the Test of Adult Basic Education (TABE) for the initial assessment of participants. This standardized assessment provided standard scores, stanine scores, and grade-equivalent scores for each employee tested. Results of both the basic skills job analysis and the TABE assessments were used to develop customized curriculum for each company. Additionally, the TABE gave CCC/UTC staff a baseline for placing participants in the program. The TABE was also administered to all participants in the project at the end of the delivery phase in order to assess possible gains made by project participants.

- Work Environment Scale (WES)

  The Work Environment Scale was used to assess employee attitudes about work. It was administered prior to the training and again at the completion of the training delivery.

- Test of Applied Literacy Skills (TALS)

  This assessment was given to selected participants at the beginning and end of training delivery in order to pilot test it as a standardized instrument that could potentially be used as an alternative to the more academic Test of Adult Basic Education. Workers related more easily to the TALS because it assesses basic skills using work-related vocabulary, computation, problems. situations, and scenarios.

- Demographics

  In addition to assessing skills levels of employees, the assessment also captured demographic information on each participant. This information included age ranges, sex, race, and number of years with company.

The identification and recruiting of individuals to participate in the program was accomplished through employee assessment. Those individuals scoring below sixth grade level on the mathematics and reading sections of the Test of Adult Basic Education (TABE) were enrolled in the Mathematics I and Communications I courses. Those individuals scoring between the sixth and ninth grade level were place in the Mathematics II and Communications II courses.

At two of the companies, training was mandatory for individuals demonstrating basic skills deficiencies on the TABE. At the third company, individuals were required to attend the first two classes and then could decide to drop or continue.

Examples of test result reports given to each company are included in Attachment B. Individual score reports were prepared and mailed to each individual's home.

F. CONDUCT ADVISING SESSIONS

Project staff conducted individual advising sessions to accomplish the following:

- explain assessment scores, results
- explain strategy for placement into specific courses
- complete individual learning plan
- get commitment of participation
- familiarize participants with learning center

Individual learning plans were completed for each individual as part of advising session. Project staff gathered in-depth information regarding educational goals, training programs taken, learning mode preference, highest grade completed, latest educational experience, expectations of the program, and computer comfort level from each participant. This information was recorded and subsequently used by instructors to enhance the learning experience of each individual. A commitment of participation was secured from each individual and learning contracts were signed by each individual and the instructor. Samples of individual learning plans are included in Attachment C.

G. DESIGN/DEVELOP CURRICULUM

The course materials for each company were designed and developed around a set of core competencies. Core materials provided the framework within which job-related materials were integrated. Job-related vocabulary was used for vocabulary-building activities; problem solving activities were based on actual job situations; forms, tickets, and other work materials were designed as work sheets, practice sheets, and simulation activities.. Criterion-referenced assessments were also developed using job-related materials.

There were four courses designed and developed for each company: **Mathematics-on-the-Job I, Mathematics-on-the-Job II, Communications-on-the-Job I, and Communications-on-the-Job II**. The objectives for each course differed from company to company, based upon the job task analysis, and the mathematics and communications requirements of each job. In addition a **Communications III** course was designed and developed for one company whose employees possessed high skill levels in the communications area.Training materials were revised after each delivery based upon input from instructors and participants.

All participant materials were published using the UTC desktop publishing systems at the UTC. Customized binders bearing the name and logo of the partner organization were prepared for each individual. UTC staff contributed hundreds of hours copying, collating, cutting, pasting, scanning, and preparing participant materials for delivery.

The design/development of curriculum was the most time consuming component of the entire project. Development should begin early in the planning stages to ensure timely completion. Increased use of off-the-shelf materials would expedite the course development process with customization and job-related materials integrated in appropriate ways.

Course descriptions and general outlines for each of the courses developed for this project are included in Attachment D. Samples of criterion-referenced assessments are included in Attachment E. A complete set of course materials has been sent to the Department of Education as well as to the Clearinghouse on Adult Education and Literacy, the ERIC Clearinghouse on Adult, Career, and Vocational Education, and the East Central Curriculum Coordination Center.

H. CONDUCT TRAIN-THE-TRAINER/INSTRUCTOR ORIENTATION

In order to prepare instructors for delivery, staff development sessions were conducted by UTC staff. These sessions followed the Jorie Philippi model for staff development and focused on the following:

- explanation and rationale of functional context instruction
- overview of program design and all curriculum components
- background on workplace literacy programs at UTC
- explanation of how participants enter and exit program
- process for administering and scoring tests
- strategy for interpreting test results and placing individuals in courses
- demonstration of how to complete an individual learning plan
- suggestions for conducting effective advising sessions
- instructional strategies for delivering curriculum
- ideas on how to motivate learners
- suggestions on how to provide sufficient time on task for practicing new skills
- provide supplemental materials or support as needed
- ideas on how to adapt delivery strategies to meet needs of low-level or ESL learners
- demonstration of how a typical instructional session should be conducted, including scheduling of activities
- methods for record keeping and assessment of learner progress
- orientation to the learning center including equipment usage, instructional materials content/technical review, scheduling procedures, record keeping procedures

I. SET UP MULTI-MEDIA LEARNING CENTER

Space was provided at each partner site (sizes vary some were unused storage closets) were transformed into learning centers where grant participants could individually practice the skills learned in the classroom.

Most of the instructional equipment and courseware used in the learning centers was provided in-kind by CCC/UTC. Funds from the grant were allocated to purchase an interactive video system. The instructional technology and accompanying programs used in the learning center are listed below.

- Reading Horizons/Mastery Drill and Practice - CD ROM
- Ferranti Interactive Mathematics - Interactive Videodisc
- Skills Bank Mathematics and Communications - Computer-Based Instruction
- Another Page Reading Improvement - Video-Based Instruction
- Mavis Beacon Introduction to Keyboarding - Computer-Based Instruction

CCC/UTC staff assisted with the transporting and set-up of instructional equipment in each of the learning centers. Instructional courseware was also loaded and tested prior to use by grant participants. Orientations to the learning centers were conducted by grant staff for instructors as well as participants.

J. SCHEDULE/CONDUCT TRAINING

During this phase, UTC staff worked with the training operations/advisory committee at each company to coordinate the scheduling and provide ongoing management of the program. As a standard format, each course consisted of 20 hours of classroom training offered in five week sessions (one partner requested 20 hour ten week sessions). Eight instructors provided the two sessions of training held at each company: 70 sections of classroom instruction held on all three shifts. Both Mathematics I & II and Communications I & II were offered at each company.

In addition to the group instruction, facilitated learning lab sessions were held in the multi-media learning centers at each of the company sites. These sessions were scheduled outside of regular class time, were conducted by the instructors and were for the most part voluntary for employees, except at one company where the sessions were mandatory.

Use of the learning centers was sporadic due to work responsibilities. Though the learning centers were open and available to participants twenty-four (24) hours a day, most participants used the center during the hours which included instructor facilitation.

The self-paced instruction interfaced effectively with the stand up instruction. Self-paced programs and objectives, even though generic in nature, were aligned with objectives for the group instruction. When participants were experiencing difficulty, instructors were able to assist them in the self-paced environment.

K. CONDUCT EVALUATION ACTIVITIES

Evaluations were filled out by each participant at the completion of each course. Results and participant comments were summarized. Copies of the evaluation reports for each company are included in Attachment F.

In addition, follow-up TABE results, WES forms and TALS tests were given at the end of delivery. The results of the before and after assessments are being tabulated by FLW Associates, the external evaluator for the project. The final evaluation report prepared by the external evaluated is attached in Attachment G.

IV. ACCOMPLISHMENTS: RESPONSE TO APPLICATION OBJECTIVES

OBJECTIVES	OUTCOMES
Identify, recruit, and enroll 302 manufacturing employees from manufacturing partners' organizations.	▸ 320 employees were identified, recruited, enrolled and trained as part of the Results-Oriented Workplace Literacy Project
Design a customized results-oriented workplace literacy program based on mutually agreed upon context, input, process and product criteria.	▸ Context, input, process, and product questions were used throughout the project period to examine and validate the program components.
Utilize a literacy task analysis, employee survey, focus groups, participant pre-training survey, and individual diagnostics to define clear performance outcomes for each participant.	▸ Task analyses were completed on three jobs at each of two companies and at nine jobs at one company. ▸ Individual advising sessions were held with each participant to define objectives ▸ Focus groups were convened at each of the three companies
Provide contextually based, process-oriented, applied workplace literacy skills programs for 4 area manufacturers that are correlated to increasing job accuracy and productivity, higher employee retention and promotion and decreased error rates and costs.	▸ Four programs in mathematics and communications were designed, developed, and delivered at each of three companies. ▸ Productivity indicators were measured before and after the training occurred: productivity, scrap and rework, absenteeism; decreases in costs could not be measured.
Utilize traditional and alternative delivery methodologies as 40-hour units of instruction, for a duration of ten (10) weeks each.	▸ Forty (40) hour units of instruction were provided over a period of ten weeks. ▸ Traditional group instruction was supplemented by individualized instruction provided in a multi-media learning center.
Implement a competency-based evaluation system that measures improvement in participant's ability to apply basic skills to the performance requirements of job tasks, improvement in job attitude and attendance, increases in quantity and quality of work, the cost benefit impact of the program on their bottom line.	▸ Improvement in job ability to do job, attitude toward job, increases in quantity and improvement in quality were measured as part of a comprehensive evaluation design. Results were inconclusive because the interval of time was not sufficient to measure long term results.
Establish an Operations/Technical Advisory Committee that will provide technical and managerial support.	▸ Operations/Advisory committees were established and functioned very effectively at all three partner sites.
Disseminate the results of the project to other manufacturers and educational providers focusing on the ease of replicating the Results-Oriented Workplace Literacy Model in other parts of the country.	▸ League for Innovations National Conference, November, 1993. ▸ National Council for Resource Development, national conference, November 1993. ▸ Forum at UTC - Manufacturing Partner, Educational Providers ▸ News release about successful implementation of the workplace program at Cleveland Wood Products. ▸ Distribution of project results and curriculum to Department of Education, DNP OVAE, Clearinghouse on Adult Education and Literacy,. ERIC Clearinghouse on Adult, Career, and Vocational Education, East Central Curriculum Coordination Center, and the Ohio Literacy Resource Center

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V. INDIVIDUAL PARTNER ACCOMPLISHMENTS/ISSUES

A. ZIRCOA, INC.

The first company involved in the project was Zircoa, Inc., established in 1952. This company, employing approximately 150 people, produces ceramic zirconium and silicate products. CCC/UTC staff worked with the Plant Manager to implement the project. The Plant Manager selected a team of hourly and union individuals to function as the operations/advisory committee and to coordinate the project at Zircoa. Though employees at Zircoa had been working in teams, members of the training team were very hesitant, especially in the beginning, to contribute freely in meetings when management was present. This continued to be true throughout the project delivery.

1. Assessment Phase

Initially UTC was to analyze three jobs at each company. At the insistence of Zircoa's Plant Manager, CCC/UTC staff analyzed nine positions which proved to be an over-investment of time and resources. The plant manager wanted to include a minimum of 100 employees in the training and did not have enough participation in three jobs alone.

Assessment was administered to all 150 employees, since at the outset of the program the stated intention of management and the team was to train all employees. As the project continued, hourly employees participated in the bulk of the basic skills training.

Results of the TABE assessment indicated that there were some math skill deficits among the workforce, but there was a very high communications (English usage) skill level. Later we learned that this high skill level could be expected at a high technology company such as Zircoa. As a result, CCC/UTC staff developed a more advanced Communications course that addressed basic verbal communications skills on the job, such as how to deal with difficult people; how to listen effectively; and how to express yourself effectively. Role playing formed a large part of the course. This course was well received and many of the hourly participants expressed the desire that management level employees would take the same training.

2. Curriculum Design Phase

The challenge to the curriculum developer was to create job-related materials that represented facets of each of the nine jobs that were analyzed. Overlapping competencies among the jobs were determined and course objectives were written for these competencies.. In some cases, individuals in specific jobs, were exposed to competencies which were not required as part of their jobs. This proved to be a plus to the members of the operations/advisory committee who felt that all Zircoa employees could benefit from learning what other employees do. After the first round of training, feedback about the curricular materials was solicited from both participants and instructors. Curricular materials were revised prior to the second round of training.

3. Delivery Phase

Because of employee resistance to the program, the introduction of the training program at Zircoa was extremely challenging. The situation was further complicated by the internal tensions of union and management. The union president was a member of training operations/advisory team. However, he was extremely threatened by the basic skills training and demonstrated little or no support of the program. Similar feelings were subsequently demonstrated by much of the hourly workforce. An analysis of the reasons for these feelings uncovered a perception by employees that the testing/training aspects of the program were a means for management to "weed people out."

To alleviate some of this anxiety, training operations/advisory team meetings were held, at the request of the Plant Manager, biweekly during the entire delivery phase. These meetings allowed team members to ask questions and advice on dealing with employee questions about the program. It also proved to be a forum for employee feedback on the program. The team put together a monthly newsletter to inform employees about the program before it started.

Individual advising sessions were conducted by UTC staff to explain assessment scoring, interpretation, and results. An in-depth interview of potential participants was conducted to secure information on educational goals, learning style preference, highest level of educational achievement, and other pertinent information necessary to complete an individual learning plan. In addition, training recommendations were made and commitment of participation was sought from each participant.

Extreme resistance was evident during first two weeks of program delivery. As participants continued through subsequent weeks, they felt less threatened and began to participate more freely in the classes. By the end of the project delivery there were many positive outcomes for the participants.

The self-paced learning lab was more heavily used at the beginning of the program than at the end. Typically some individuals were regular users of the lab and one individual chose to go through his math course entirely in the lab's self-paced environment.

4. Evaluation Phase

By the end of the first round of training at Zircoa, the training was totally accepted and moving forward very effectively. The Zircoa operations/advisory committee continued to have problems recognizing the positive aspects of the program. By the end of the second round, this was not so much of a concern since much, if not all of the original employee anxiety, had dissipated. There were even requests for information on when more training would begin.

5. Follow-Up

Now that the services provided by the National Workplace Literacy Program have been completed, Zircoa has requested and scheduled additional sections of Mathematics II and Communications II for all of those who took the first courses under the grant. In addition, they have requested Communications III for those in the company who have not had it. The Unified Technologies Center has been written into the union contract as the educational provider for these courses.

B. TRW, INC., VALVE DIVISION

The second company participating in the grant program was TRW, Inc., Valve Division, an automotive supplier of valves which was founded in 1901. The parent company has 100 plants in 17 countries and manufactures steering and suspension components, occupant restraint systems, engine components, electrical-electronic controls, and engineered fasteners. This particular site of TRW employees approximately 900 people. This company had a training program (excluding basic skills) in place prior to partnering with UTC in the workplace literacy project. Employees were accustomed to participating in training programs. Though the attitude toward training was not always positive, there was still less resistance to overcome than at Zircoa.

1. Assessment Phase

Job analysis had been performed on the position of Automation Operator at TRW Valve and a pilot group had been assessed and trained prior to partnering with CCC/UTC in the workplace literacy grant. Under the grant, Heavy Duty Operators and Inspectors were added to the project and job analysis was performed on these positions.

TABE assessment results indicated basic skills deficits in over 200 employees. One hundred fifty-one (151) employees participated in either one or two courses. Mathematics and Communications I & II were indicated for a number of participants. Individual TABE results and course recommendation meetings were provided for the workers who took the TABE. During this phase there was tremendous support from management for putting the program in place and test and advising sessions went very well.

2. Curriculum Design Phase

Mathematics and communications competencies determined in jobs analyzed at TRW were similar in many cases to those of the jobs analyzed at Zircoa. As much as possible, the curriculum developer used the core materials which existed from the first company and integrated job-related materials from the second company. Activities using job-related vocabulary and problem solving situations were developed as exercises in all courses. After the first round of training, feedback about the curricular materials was solicited from both participants and instructors. Curricular materials were revised prior to the second round of training.

3. Delivery Phase

Due to TRW having other training programs in place and in progress, the delivery schedule for the grant training was modified to ten-week sessions, one day of training per week for grant participants. During the first round of this phase, management support of the project continued to be strong with newsletter reminders of upcoming training and progress reports on the training and its purpose in the larger scheme of TRW programs. Prior to the second round of training the TRW grant representative opted to take an early retirement offer. In addition there were layoffs among the hourly workers. These incidents had an effect on the remainder of the grant training: morale plummeted among the employees; there was little management support for the program due to TRW not replacing the Human Resource function of the TRW grant representative. Enrolment and participation in the second round was lower than in the first round. The self-paced lab was under-utilized.

4. Evaluation Phase

In spite of the layoffs and other circumstances at TRW, those participants who stayed with the program gave it positive evaluations and found it beneficial to them professionally and personally. They also expressed an interest in more training in light of the fact that there would be more layoffs. Most employees wanted to get as much as training as possible before future layoffs.

5. Follow-Up

Though TRW Valve has not continued the basic skills training with remaining employees, it has contracted with CCC/UTC to provide a number of technical and supervisory development programs including blueprint reading, teambuilding, and group problem solving.

C. CLEVELAND WOOD PRODUCTS (CWP)

CWP was an interesting and different project site: it is a small, non-union company that had no experience with formal training programs prior to the workplace literacy program. There was a number of non-English speaking personnel. Also, the company uses a large number of temporary employees on a semi-permanent basis and some of them participated in the program. There was strong management support of the program with the intention of establishing a vehicle for further future training.

CWP established an operations/advisory committee consisting of two hourly workers, two supervisors, the Quality Engineer and the CCC/UTC representatives. There was a lot of groundwork to be done initially with this group. Over the course of the grant delivery they became a very effective vehicle for keeping other employees informed and involved in the grant project. Members worked through their own anxieties and assisted other employees by answering questions and providing support. Of all the companies, this team was the most effective in keeping employee involvement on a positive level.

1. Assessment Phase

This was the most difficult phase for CWP, due to the high level of anxiety of employees. The TABE was given. Individuals received tests results and recommended courses in the mail per the operations/advisory committee request. Individual advising time was offered for those who wanted it.

There was a wide range of basic skill deficiencies at CWP. Communications and Mathematics courses had to be adapted to lower levels than at the other companies.

2. Curriculum Design Phase

Mathematics and communications competencies determined in jobs analyzed at CWP were similar in many cases to those of the jobs analyzed at Zircoa and TRW Valve. However, the test results of the employees indicated a much greater need for basic skills in mathematics and communications. The courses developed were paced much more slowly and covered less material in the twenty hours designated than similar courses at other companies. The curriculum developer used many of the core materials which existed from the first and second company and integrated job-related materials from the third company. Activities using job-related vocabulary and problem solving situations were developed as exercises in all courses. After the first round of training, feedback about the curricular materials was solicited from both participants and instructors. Curricular materials were revised prior to the second round of training.

3. Delivery Phase

The delivery at CWP was the smoothest of the three companies. Reasons include its smaller size, relatively non-hostile environment, and continual, positive and strong internal management involvement.

By the end of the training project, the overall anxiety level had decreased significantly and there were many requests for continued training. As a first experience with training, the grant project turned out to be very positive for most employees involved. Others still had difficulty understanding the relation of the training to their jobs.

4. Evaluation Phase

Evaluations were especially positive for the instructors at CWP. A very productive relationship between instructors and the employees formed over the grant training period. This has been reflected in the request for continued mathematics training for those slower classes who did not complete the training during the grant period. The same instructor has been requested by CWP for these classes.

5. Follow-Up

Cleveland Wood Products has contracted with CCC/UTC to deliver the second half of the mathematics program that was started under the grant with the limited English speaking employees. CWP is also planning to use CCC/UTC to design and develop a more advanced mathematics course for all employees. This course will include familiarity with the metric system, metric conversions, and problem solving with metrics.

VI. DISSEMINATION ACTIVITIES

UTC/CCC staff participated in a number of dissemination activities. These included:

- Presentation of the project activities and results at the National Conference of the League for Innovations in November of 1993.
- Presentation of project activities and results at the National Council for Resource Development
- Presentation of project activities, curriculum, and results at national close-out conference in Washington D.C.
- Press release on activities and outcomes of project at Cleveland Wood Products.
- Forum at UTC - Manufacturing Partner and Educational Providers
- Videotaping of partner representatives' reactions and results for inclusion in CCC/UTC promotional video
- Mailing of copies of curricular materials and project reports to Department of Education, DNP OVAE, the Clearinghouse on Adult Education and Literacy, ERIC Clearinghouse on Adult, Career and Vocational Education, and the East Central Curriculum Coordination Center.
- Mailed information in response to approximately 35 requests for information

VII. EVALUATION ACTIVITIES

The project was evaluated on several levels. Participants commented on the relevance of the course content to their jobs, the methods of instruction, instructors, the facilities, most useful information, and least useful information. Comprehensive evaluation reports from each company after each round of training are included in Appendix G.

The project also employed an external evaluation team which analyzed the changes in pre and post test scores, productivity, quality, scrap/rework, and absenteeism. This information is contained in a comprehensive evaluation report which accompanies this document.

VIII. PRIMARY LESSONS LEARNED

A. Assessment Phase

1. The assessment of employees proved to be most difficult part of the entire process. Even though information meetings were conducted, employees were still very uncomfortable with the assessment.

   The use of assessment instruments that are not as academic as the TABE would help to ease the process. The development of diagnostic work-related tests to assess and place individuals in appropriate levels would take a significant amount of time. However, employees would be much more comfortable with an assessment instrument that deals with things they are familiar with. Ultimately, there would be less resistance to the entire project.

2. The Test of Applied Literacy Skills (TALS), piloted in one of the partner companies, proved to be a more appropriate tool for assessing basic skills. In the future, this assessment would be used. Strategies for determining levels of basic skills as they relate to specific job, would need to be determined

3. In future grants CCC/UTC staff will select companies with demonstrated basic skills deficiencies as partners. One of the partner companies where there was not a serious basic skills problem required that CCC/UTC staff provide training for a designated number of employees in higher level job-related communications. This put an additional strain on the curriculum design team and resulted in an additional course being designed to respond to the needs of this partner.

B. Job/Task Analysis

1. Job/task analysis activities were conducted about six weeks prior to the delivery of training. This put a lot of pressure on the curriculum developer to quickly develop course materials. A minimum of ten weeks should be allocated to develop course materials after the completion of the job/task analysis.

2. More photographs and videotapes could be taken and integrated into the courses.

   All instructors need to be involved in the job task analysis. In this project, instructors were identified, in some cases, after the job/task analysis had already been completed. Instructors can be much more effective if they are involved in the job/task analysis and curriculum development activities.

C. Curriculum Design

1. Job-related materials were integrated into the curriculum. Workers agreed that the courses related to their jobs but still felt that additional effort could have been made to make them entirely job-related. The amount of customization required to do this is almost prohibitive in terms of cost and time, but could definitely make the programs more effective.

2. Many jobs require similar basic skills competencies. A boilerplate format for basic skills competencies used in many manufacturing jobs would facilitate the curriculum development process.

3. CCC/UTC staff did not anticipate the number of hours needed to desktop publish and prepare training materials. Additional funds are needed to support this in the future.

D. Training Delivery

1. The question of mandatory vs. voluntary surfaced at each of the partner companies. Those companies who required workers to participate met with more resistance than those who allowed workers the options. However, in many cases, those workers who opted not to participate were those most in need of the basic skills training. With the third company, and with the experience gained from the first two companies, CCC/UTC staff decided to make the program mandatory for the first three sessions after which employees would have the option to stay or leave. This proved to be a very successful strategy. Workers agreed to participate for at least the first three sessions, and once they were involved in the classes, decided to continue in 96% of the cases. The instructors are credited with this fine retention rate.

2. More regular use of the self-paced learning center would have helped low level and limited English speaking workers in their group instructional classes. Only one of the three companies permitted use of the learning center on work time. Usage at the other two

companies was limited to lunch hours and breaks. Only the really committed employees used the center on their own time.

E. Training Evaluation

1. A more systematic plan for gathering the productivity data is required. Data captured prior to and after the training existed in formats which were not useful to the evaluation team in analyzing changes. Getting the evaluation team involved in the writing of the grant proposal would facilitate this. Working more systematically with the partner companies in formatting the data appropriately would also help.

2. Productivity data needs to be analyzed for a longer period of time after the training is completed. A longitudinal study which would isolate more variables and evaluate the performance of individuals would provide much more information about the effectiveness of the workplace literacy programs.

LIST OF ATTACHMENTS

A. Copies of the job task analysis for each of the three partner companies

B. Examples of test results given to each company

C. Samples of Individual Learning Plan

D. Course description and general outline for each course

E. Samples of Criterion-referenced assessments

F. Reports compiled from student evaluation forms completed at the end of each course

G. Final evaluation report (by FLW Associates)

ATTACHMENT A

CLEVELAND WOOD PRODUCTS
JOB ANALYSIS REPORT:

WOOD SHOP OPERATOR

BRUSH SHOP OPERATOR

Performed on November 24, 1992
As part of the
National Workplace Literacy Program

by

The Unified Technologies Center

CLEVELAND WOOD PRODUCTS
JOB ANALYSIS REPORT:

Wood Shop Operator
and
Brush Shop Operator

Overview:

The Cleveland Wood Products (CWP) job analysis was performed on Wood Shop Operator and Floor and Brush Shop Operator positions for the purpose of developing a basic skills curriculum under the National Workplace Literacy Program.

Purpose and Method:

In order to identify the basic skills used in each of the three jobs selected, the Unified Technologies Center staff used the following steps:

1. Review of documents used on the job for each job category, including blueprints, manuals, SOP documentation, charts, forms, etc., for skill levels needed to use them.
2. Identification of critical tasks for each job. These critical tasks for each of the job areas were identified by the UTC staff after employee observation/interview sessions.
3. Interview employees performing those jobs about what they do and how they do their daily tasks.
4. Observe employees performing their job tasks.

The information resulting from these steps was used in the development of Mathematics and Communications courses customized to the CWP employees in the job categories specified.

Analysis Results

An Applied Basic Skills Analysis chart for the Wood and Brush Shop areas are attached to this report summary. These charts present the applied basic skills associated with the critical tasks identified for each job.

Analysis Results (Continued)

The computation and reading comprehension skill levels indicated as a minimum below reflect the higher level of charting and procedure documentation that is being introduced in these jobs. Not all operators currently do or need to function at these levels; however, they would be a logical goal to strive for based on CWP's plans for refining their processes and upgrading employee skills.

It is also important be certain that process documentation is produced at a reading skill level that does not exceed the skill level established by CWP. This is a common situation companies find themselves in since much standard documentation for equipment and machinery is written at a level higher than is useful.

WOOD SHOP OPERATOR REQUIRED BASIC SKILL LEVELS:

Minimum Computation Skill Grade Level - 8
Minimum Reading Skill Grade Level - 8

BRUSH SHOP OPERATOR REQUIRED BASIC SKILL LEVELS:

Minimum Computation Skill Grade Level - 8
Minimum Reading Skill Grade Level - 8

Interpretation of Basic Skill Levels

Skill levels are reported in grade-level format as a convenient reference point to traditional educational settings and as an aid in development of course materials. When interpreting or reporting basic skills analysis results to individuals involved in associated training programs, focus is on the specific applied basic skills required for a job rather than on a simple grade-level designation in order to minimize association of company training programs with traditional educational programs.

TRW VALVE DIVISION
JOB ANALYSIS REPORT:

HEAVY DUTY MACHINING OPERATOR

FLOOR & VISUAL INSPECTORS

Performed on November 11, 1992
As part of the
National Workplace Literacy Program

by

The Unified Technologies Center

TRW VALVE DIVISION
JOB ANALYSIS REPORT:

Heavy Duty Machine Operator
and
Floor and Visual Inspectors

Overview:

TRW Valve Division job analysis was performed on Heavy Duty Machine Operator and Floor and Visual Inspector positions for the purpose of developing a basic skills curriculum under the National Workplace Literacy Program. In addition to these two jobs, the position of Automation Operator had been analyzed for basic skill requirements in March 1992.

A copy of the Automation Operator job task analysis is attached to this current report. Information from all three job categories was included in the course programming.

Purpose and Method:

In order to identify the basic skills used in each of the three jobs selected, the Unified Technologies Center staff used the following steps:

1. Review of documents used on the job for each job category, including blueprints, manuals, SOP documentation, charts, forms, etc., for skill levels needed to use them.

2. Identification of critical tasks for each job. These critical tasks for each of the job areas were identified by the TRW Valve Division training team prior to job analysis and confirmed during analysis by UTC staff.

3. Interview employees performing those jobs about what they do and how they do their daily tasks.

4. Observe employees performing their job tasks.

The information resulting from these steps was used in the development of Mathematics and Communications courses customized to the TRW Valve Division employees in the job categories specified.

Analysis Results

An Applied Basic Skills Analysis chart for the Heavy Duty and Inspection areas are attached to this report summary. These charts present the applied basic skills associated with the critical tasks identified for each job.

Some factors to note in the analysis of the Heavy Duty and Inspector functions include:

- Reading skill levels required for Heavy Duty Machining Operators using reflects the level of training they are given and technical resources they consult in relation to CNC equipment, for example.
- Computation skill level for Visual Inspectors would be significantly higher (9th grade), if inspectors are included in cross-functional teams and asked to perform any SPC charting activities.
- Required day-to-day reading skill level for Visual Inspectors is at a level of 8th grade -- in their day-to-day job. Visual Inspectors do not read written materials. It is important to note, however, that their skill reflects a high capacity for and experience with detecting ("reading") subtle visual details.
- Training of new inspectors is accomplished by one-on-one on-the-job training with an experienced inspector. The QCO-122 Visual Inspection Standard reference manual is not used. Readability of this manual is 11th grade level that may discourage its use.

HEAVY DUTY MACHINING OPERATOR REQUIRED BASIC SKILL LEVELS:

Minimum Computation Skill Grade Level - 9
Minimum Reading Skill Grade Level - 10

FLOOR INSPECTOR REQUIRED BASIC SKILL LEVELS:

Minimum Computation Skill Grade Level - 9
Minimum Reading Skill Grade Level - 11

VISUAL INSPECTOR REQUIRED BASIC SKILL LEVELS:

Minimum Computation Skill Grade Level - 6 (9 if SPC charting activities will)
Minimum Reading Skill Grade Level - 8 (11 if referencing current documentation)

Interpretation of Basic Skill Levels

Skill levels are reported in grade-level format as a convenient reference point to traditional educational settings and as an aid in development of course materials. When interpreting or reporting basic skills analysis results to individuals involved in associated training programs, focus is on the specific applied basic skills required for a job rather than on a simple grade-level designation in order to minimize association of company training programs with traditional educational programs.

Applied Basic Skills Analysis:
TRW Heavy Duty Machining Operator

Company: TRW Valve Division

Date: 11/10/92

Employee Name: Randy Outler
Joe Gabriel

Job Title: Heavy Duty Machining Operator
Supervisor

Critical Tasks

Computation skills:	Read & Interpret B/Ps for Set-up & Adjustment	Read, Interpret & Apply SOP Information	Use Gages & Measuring Devices	SPC
Performing whole number operations.				
o Read, write, count single digit and multiple digit whole numbers to complete a task.	X	X	X	X
o Add, subtract, multiply divide single and multiple digit numbers to complete a task.	X	X	X	X
• Use addition, subtraction, multiplication and division to solve problems with single and multiple digit numbers.	X	X	X	X
• Round off single and multiple digit numbers to complete a task.			X	X
Using fractions.				
o Read, write common fractions to complete a task.		X		X
• Add, subtract, multiply, divide common fractions to solve problems.				X
Using decimals.				
o Carry out arithmetic computations involving dollars and cents.				
o Read and write decimals to one and more places to complete a task.	X	X	X	X

• Indicates skills directly involved with using problem-solving strategies or interpretation.

	Critical Tasks			
Computation Skills	**Read & Interpret B/Ps for Set-ip & Adjustment**	**Read, Interpret & Apply SOP Information**	**Use Gages & Measuring Devices**	**SPC**
Using decimals.				
* Round off decimals to one and more places to complete a task.			X	X
* Add, subtract, multiply and divide decimals to one and more places to solve a problem.			X	X
Using percents.				
o Read, write, compute percents to complete a task.				X
Performing mixed operations.				
* Convert fractions to decimals, percents to fractions, fractions to percents, percents to decimals, common fractions or mixed numbers to decimal fractions, and decimal fractions to common fractions or mixed numbers to complete a task.	X	X	X	X
* Solve problems by selecting and using correct order of operations.				X
o Compute averages, ranges or ratios to complete a task.				X

* Indicates skills directly involved with using problem-solving strategies or interpretation.

Critical Tasks

Computation Skills:	Read & Interpret B/Ps for Set-up & Adjustment	Read, Interpret & Apply SOP Information	Use Gages & Measuring Devices	SPC
Measurements and calculation.				
• Read numbers or symbols from time, weight, distance and volume measuring scales.			X	X
• Use measuring device to determine an object's weight, distance or volume			X	X
• Perform basic metric conversions involving weight, distance, and volume.				
• Use calculator to perform basic arithmetic operations to solve problems.			X	X
Estimations.				
• Determine if a solution to a mathematical problem is reasonable.			X	X

• Indicates skills directly involved with using problem-solving strategies or interpretation.

	Critical Tasks			
Reading Skills:	**Read & Interpret B/Ps for Set-up & Adjustment**	**Read, Interpret & Apply SOP Information**	**Use Gages & Measuring Devices**	**SPC**
Vocabulary				
o Recognize common words and meanings, task-related words with technical meanings, or meanings of common abbreviations and acronyms.	X	X	X	X
Literal Comprehension				
o Identifying factual details and specifications within text.	X	X	X	
o Follow sequential directions to complete a task.	X	X	X	X
o Determine the main idea of a paragraph or section.				
Locating information within a text				
o Use table of contents, index, appendices, glossary, systems or sub systems.		X		
o Locate pages, titles, paragraphs, figures, charts needed to answer questions or solve problems.	X	X		
o Skim or scan to determine whether or not text contains relevant information.		X		
o Cross-reference within and across source materials to select information to perform a routine.		X		
o Use a completed form to locate information to complete a task.	X	X		X

Critical Tasks

Reading Skills:	Read & Interpret B/Ps for Set-up & Adjustment	Read, Interpret & Apply SOP Information	Use Gages & Measuring Devices	SPC
Comparing and contrasting				
o Combine information from multiple sources that contribute to the completion of a task.	X	X		X
o Select part of text or visual materials to complete a task.	X	X	X	X
o Identify similarities and differences in objects.	X		X	X
o Determine the presence of a defect or extent of damage.		X	X	X
o Classify or match objects by color, size, or significant marking.				
o Distinguish between relevant and irrelevant information in text or visuals.	X	X	X	X
Recognizing cause and effect; predicting outcomes.				
o Use common knowledge for safety.			X	
o Apply preventative measures prior to a task to minimize problems.			X	
o Select appropriate course of action in emergency.		X		
Using charts, diagrams, schematics				
o Read two or more column charts to obtain information.	X	X		X

Critical Tasks

Reading Skills:	**Read & Interpret B/P's for Set-up Adjustment**	**Read, Interpret & Apply SOP Information**	**Use Gages & Measuring Devices**	**SPC**
o Apply information from tables or graphs to locate malfunctions or select actions.		X		X
o Use flow charts and organizational charts to sequence events, arrive at a decision, or problem solve.		X		
o Identify component within a schematic.	X	X		
o Isolate problem components in schematics, trace to cause of problem, and interpret symbols.	X	X		X
o Identify details, labels, numbers, parts of an illustration, parts from a key or legend.	X	X		
o Follow sequence illustrations as a guide.	X	X		
o Interpret three-dimensional drawings of objects for assembly or disassembly.	X	X		
Inferential comprehension.				
o Determine meaning of figurative, idiomatic, or technical usage of terms, using context clues as reference.	X	X		
o Make inferences from text.	X	X		
o Organize information from multiple sources into a series.	X	X		X
o Interpret codes and symbols.	X	X	X	X

Applied Basic Skills Analysis:
TRW Inspection (Manufacturing Related)

Company: TRW Valve Division

Date: 11/10/93

Employee Name: Ray Cox, Cora Collins
Bob Shelman, Bill Wolfe

Job Title: Floor Inspector (X), Visual Inspector (✓)
Supervisors

Critical Tasks

Computation skills:	**Read & Interpret B/Ps & Layouts**	**Make Decisions & Complete Documentaion**	**Identify Valve Defects**
Performing whole number operations.			
o Read, write, count single digit and multiple digit whole numbers to complete a task.	X ✓	X ✓	
o Add, subtract, multiply divide single and multiple digit numbers to complete a task.	X ✓	X ✓	
• Use addition, subtraction, multiplications and division to solve problems with single and multiple digit numbers.	X	X	
• Round off single and multiple digit numbers to complete a task.	X	X	
Using fractions.			
o Read, write common fractions to complete a task.	X	X	X
• Add, subtract, multiply, divide common fractions to solve problems.	X	X	X
Using decimals.			
o Carry out arithmetic computations involving dollars and cents.			
o Read and write decimals to one and more places to complete a task.	X	X	

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Critical Tasks

Computation Skills	Read & Interpret B/Ps & Layouts	Make Decisions & Complete Documentation	Identify Valve Defects
Using decimals.			
• Round off decimals to one and more places to complete a task.	X	X	X
• Add, subtract, multiply and divide decimals to one and more places to solve a problem.		X	X
Using percents.			
o Read, write, compute percents to complete a task.		X	X
Performing mixed operations.			
• Convert fractions to decimals, percents to fractions, fractions to percents, percents to decimals, common fractions or mixed numbers to decimal fractions, and decimal fractions to common fractions or mixed numbers to complete a task.		X	X
• Solve problems by selecting and using correct order of operations.		X	X
o Compute averages, ranges or ratios to complete a task.	X	X	

• Indicates skills directly involved with using problem-solving strategies or interpretation.

	Critical Tasks		
Computation Skills:	Read & Interpret B/Ps & Layouts	Make Decisions & Complete Documentation	Identify Valve Defects
Measurements and calculation.			
• Read numbers or symbols from time, weight, distance and volume measuring scales.	X	X ✓	X
• Use measuring device to determine an object's weight, distance or volume		X	X
• Perform basic metric conversions involving weight, distance, and volume.			X
• Use calculator to perform basic arithmetic operations to solve problems.		X	X
Estimations.			
• Determine if a solution to a mathematical problem is reasonable.		X	X

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Critical Tasks

Reading Skills:	Read & Interpret B/Ps & Layouts	Make Decisions & Complete Documentation	Identify Valve Defects
Vocabulary			
o Recognize common words and meanings, task-related words with technical meanings, or meanings of common abbreviations and acronyms.	X ✓	X ✓	X ✓
Literal Comprehension			
o Identifying factual details and specifications within text.			X ✓
o Follow sequential directions to complete a task.		X ✓	X ✓
o Determine the main idea of a paragraph or section.	X ✓	X ✓	X ✓
Locating information within a text			
o Use table of contents, index, appendices, glossary, systems or sub systems.	X	X	X
o Locate pages, titles, paragraphs, figures, charts needed to answer questions or solve problems.	X	X ✓	X ✓
o Skim or scan to determine whether or not text contains relevant information.	X ✓	X	X ✓
o Cross-reference within and across source materials to select information to perform a routine.	X ✓	X ✓	X ✓
o Use a completed form to locate information to complete a task.	X	X ✓	X ✓

	Critical Tasks		
Reading Skills:	**Read & Interpret B/Ps & Layouts**	**Make Decisions & Complete Documentation**	**Identify Valve Defects**
Comparing and contrasting			
o Combine information from multiple sources that contribute to the completion of a task.		X ✓	X ✓
o Select part of text or visual materials to complete a task.		X ✓	X ✓
o Identify similarities and differences in objects.		X ✓	X ✓
o Determine the presence of a defect or extent of damage.	X ✓	X ✓	X ✓
o Classify or match objects by color, size, or significant marking.		X ✓	X ✓
o Distinguish between relevant and irrelevant information in text or visuals.	X ✓	X ✓	X ✓
Recognizing cause and effect; predicting outcomes.			
o Use common knowledge for safety.		X	X ✓
o Apply preventative measures prior to a task to minimize problems.		X	
o Select appropriate course of action in emergency.		X	X ✓
Using charts, diagrams, schematics			
o Read two or more column charts to obtain information.		X	X

Critical Tasks

Reading Skills:	**Read & Interpret B/Ps & Layouts**	**Make Decisions & Complete Documentation**	**Identify Valve Defects**
o Apply information from tables or graphs to locate malfunctions or select actions.		X	X ✓
o Use flow charts and organizational charts to sequence events, arrive at a decision, or problem solve.		X	X
o Identify components within a schematic.	X ✓		X
o Isolate problem components in schematics, trace to cause of problem, and interpret symbols.	X ✓		X
o Identify details, labels, numbers, parts of an illustration, parts from a key or legend.	X ✓		X ✓
o Follow sequence illustrations as a guide.		X	X ✓
o Interpret three-dimensional drawings of objects for assembly or disassembly.	X		
Inferential comprehension.			
o Determine meaning of figurative; idiomatic, or technical usage of terms, using context clues as reference.	X	X	X ✓
o Make inferences from text.	X	X	
o Organize information from multiple sources into a series.		X	X
o Interpret codes and symbols.	X ✓	X	X ✓

TRW
JOB ANALYSIS REPORT:

AUTOMATION OPERATOR

Performed March 4, 1992
by
The Unified Technologies Center

TRW JOB ANALYSIS REPORT

Purpose and Method

To determine the basic skill levels required for competant performance of the TRW Automation Operator position, job analysis was conducted at the request of TRW on the roughing and finishing ends the Atuomation Operator function. Results of the analysis may be used as a basis for upgrading skills of current operators; assisting in training of new operators; and as a means for standardizing Automation Operator job documentation.

The job analysis process included the following steps:

- Review of Automation Operator job-related documents, including blueprints, report forms, training manual materials, for skills application levels.
- Identification and prioritization of critical tasks performed by Automation Operators. This step took place on February 28, 1992 at TRW with a group of Automation Operators, supervisors and union representatives working with UTC facilitators. Critical tasks were identified by this group as the operator functions of: Reading Blueprints, Setting Gages, and Maintaining Set-up for Continuous Run.
- Interviews with and observations of competent performers and their supervisors selected by TRW. These sessions took place March 3, 1992.

Analysis Results

A detailed list of applied basic skills required for the TRW Automation Operator position are presented on the attached Applied Basic Skills Analysis summary sheets. These summary sheets connect the applied basic skills of the job to the critical tasks determined by TRW at the beginning of the project.

In addition to the three critical tasks determined by the TRW group (Reading Blueprints, Setting Gages, and Maintaining set-up for Continuous Run), UTC has included SPC Charting as a critical task of the job and has listed the associated applied basic skills for that function of the Automation Operatror position. Although this task is not viewed as critical by the operators themselves, it was clear during observations that SPC charting is an integral part of their postion.

Basic computation and reading skill levels determined for competent performance of the TRW Automation Operator position are based on the attached Applied Basic Skills Analysis summary sheet and on analysis of written documentation associated with the job.

Computation skills reuired are based primarily on current and possible future SPC charting activities. Reading skill level for materials varied widely, from 3rd to 20th grade levels, with majority of materials being in the 6th to 14th grade range. A 10th grade level would cover the majority of procedures and troubleshooting documents in the Training Guide.

AUTOMATION OPERATOR APPLIED BASIC SKILL LEVELS

Minimum computation level required - 8th grade (at current Automation Operator level)
9th grade (for SPC charting activity beyond current levels)

Minimum reading skill required - 10th grade

Applied Basic Skills Analysis:
TRW Automation Operator

Company TRW Valve Division

Date 3/4/92

Employee Interviwed/Observed Samuel Cox, Robert Digideo
Howard Evans, Don Mathis

Job Title Automation Operator

Critical Tasks

Computation skills:	Read Blueprints	Set Gauges	Maintain Set-up for Continuous Run	SPC Charting
Performing whole number operations.				
o Read, write, count single digit and multiple digit whole numbers to complete a task.	X	X		
o Add, subtract, multiply divide single and multiple digit numbers to complete a task.	X	X		
* Use addition, subtraction, multiplications and division to solve problems with single and multiple digit numbers.	X	X	X	
* Round off single and multiple digit numbers to complete a task.	X	X	X	
Using decimals.				
o Read and write decimals to one and more places to complete a task.	X	X	X	X

* Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis:
TRW Automation Operator

Critical Tasks

Computation Skills	Reading Blueprints	Set Gauges	Maintain Set-up for Continuous Run	SPC Charting
Using decimals.				
• Round off decimals to one and more places to complete a task.	X	X		
• Add, subtract, multiply and divide decimals to one and more places to solve a problem.	X	X		
Performing mixed operations.				
• Convert fractions to decimals, percents to fractions, fractions to percents, percents to decimals, common fractions or mixed numbers to decimal fractions, and decimal fractions to common fractions or mixed numbers to complete a task.				
o Compute averages, ranges or ratios to complete a task.	X	X	X	X

- Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis: TRW Automation Operator

Critical Tasks

Computation Skills:	Read Blueprints	Set Gauges	Maintain Set-up for Continuous Run	SPC Charting
Measurements and calculation.				
• Read numbers or symbols from time, weight, distance and volume measuring scales.	X	X	X	
• Use measuring device to determine an object's weight, distance or volume	X	X	X	X
Estimations.				
• Determine if a solution to a mathematical problem is reasonable.	X	X (Reading Gauges)		

• Indicates skills directly involved with using problem-solving strategies or interpretation.

C2

C1

Applied Basic Skills Analysis:
TRW Automation Operator

Critical Tasks

Reading Skills:	Read Blueprints	Set Gauges	Maintain Set-up for Continuous Run	SPC Charting
Vocabulary				
o Recognize common words and meanings, task-related words with technical meanings, or meanings of common abbreviations and acronyms.	X	X	X	X
Literal Comprehension				
o Identifying factual details and specifications within text.	X	X	X	X
o Follow sequential directions to complete a task.	X	X	X	
Locating information within a text				
o Use table of contents, index, appendices, glossary, systems or sub systems.	X	X	X (using training manual)	
o Locate pages, titles, paragraphs, figures, charts needed to answer questions or solve problems.	X	X	X (using training manual)	
o Skim or scan to determine whether or not text contains relevant information.			X (using manual)	
o Cross-reference within and across source materials to select information to perform a routine.		X	X	
o Use a completed form to locate information to complete a task.	X	X	X	

Applied Basic Skills Analysis:
TRW Automation Operator

Critical Tasks

Reading Skills:	Read Blueprints	Set Gauges	Maintain Set-up for Continuous Run	SPC Charting
Comparing and contrasting				
o Combine information from multiple sources that contribute to the completion of a task.	X	X	X	
o Select part of text or visual materials to complete a task.	X	X	X	
o Identify similarities and differences in objects.	X	X	X	
o Determine the presence of a defect or extent of damage.		X	X	X
o Classify or match objects by color, size, or significant marking.		X	X	
o Distinguish between relevant and irrelevant information in text or visuals.	X (for those that are not up-to-date)	X (for those who are not up-to-date)	X	
Recognizing cause and effect; predicting outcomes.				
o Use common knowledge for safety.			X	
o Apply preventative measures prior to a task to minimize problems.			X	
o Select appropriate course of action in emergency.			X	
Using charts, diagrams, schematics				
o Read two or more column charts to obtain information.	X		X	X

Applied Basic Skills Analysis:
TRW Automation Operator

Critical Tasks

Reading Skills:	Read Blueprints	Set Gauges	Maintain Set-up for Continuous Run	SPC Charting
o Apply information from tables or graphs to locate malfunctions or select actions.		X	X	
o Use flow charts and organizational charts to sequence events, arrive at a decision, or problem solve.			X	
o Identify components within a schematic.	X		X	
o Isolate problem components in schematics, trace to cause of problem, and interpret symbols.	X		X	
o Identify details, labels, numbers, parts of an illustration, parts from a key or legend.	X	X		
o Follow sequence illustrations as a guide.		X		
o Interpret three-dimensional drawings of objects for assembly or disassembly.	X			
Inferential comprehension.				
o Determine meaning of figurative, idiomatic, or technical usage of terms, using context clues as reference.	X		X	
o Interpret codes and symbols.	X	X	X	X

ZIRCOA
JOB ANALYSIS REPORT

The Unified Technologies Center
November 30, 1992

ZIRCOA JOB ANALYSIS REPORT

Overview

Job analysis took place at Zircoa on nine (9) jobs: BGM Operator, Fine Grain Batch Mixer, Grain Plant Operator/Shift Leader, Kiln Operator/Loader, Machinist Class "A," Maintenance Tradesworker, Packer Inspector Loader, Press Operator, and Slipcaster/Slipcast Specialist.

BGM Operator, Maintenance Tradesworker and Packer/Inspector Loader were the three jobs that Zircoa wanted UTC to focus on in the analysis as the three most critical jobs in their operation.

Purpose and Method

Purpose for the job analysis was to determine the basic mathematics and reading skills used in each of the jobs. The steps in the process were:

1. Review documents used on the job for each of the nine jobs, including manuals, SOP documentation, charts, forms etc.
2. Identify critical tasks for each job.
3. Interview employees in those jobs about what they do in performing their daily job tasks.
4. Observe them performing their job tasks.

Analysis Results

The following three critical tasks were identified by Zircoa as applying to all nine jobs that were analyzed. All workers should be able to:

1. To read and understand process documents.
2. Chart data.
3. Be prepared for using automation.

Applied Basic Skills Analysis forms and Summary Analysis Sheets are included for each job in this report. The Analysis Forms are detailed lists of computation, reading and communication skills for each job. Summary Sheets list the basic computation, reading and communication skills and the corresponding grade skill level identified for each job.

JOB ANALYSIS SUMMARY SHEET

COMPANY: ZIRCOA

JOB TITLE: BGM OPERATOR

BASIC COMPUTATION SKILLS REQUIRED:

Must be able to: perform whole number operations; use decimals; compute percents; perform mixed operations; perform measurement and use in calculations; make estimations.

BASIC READING SKILLS REQUIRED:

Must be able to: recognize and use task-related words with technical meanings, or meanings of common abbreviations and acronyms; identify factual details; follow sequential directions; locate information; skim and scan forms; cross-reference within and across source materials; use completed forms to locate information to complete a task; compare and contrast information ; combine information from multiple sources; select part of text or visual materials; identify similarities and differences; determine presence of defect or damage; distinguish between relevant and irrelevant information; recognize cause and effect; predict outcomes; use charts to sequence events; make inferences.

BASIC COMMUNICATION SKILLS REQUIRED:

Must be able to: understand and write process documentation; fill out forms with data and comments; communicate verbally with other team members; future use of keyboarding skills.

BASIC SKILL LEVELS REQUIRED FOR **ZIRCOA BGM OPERATOR** :

Computational skill level:	8.9
Reading/communications skill level:	10.0

10/6/92

Applied Basic Skills Analysis
Zircoa - BGM Operator

Company Zircoa

Date 9/4/92 .

Employee Name Dick Ball

Job Title BGM Operator

Supervisor Rob Morris

Critical Tasks

Computation Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Performing whole number operations.			
o Read, write, count single digit and multiple digit whole numbers to complete a task.	X	X	
o Add, subtract, multiply, divide single and multiple digit numbers to complete a task.	X	X	
• Use addition, subtraction, multiplication and division to solve problems with single and multiple digit numbers.	X	X	
• Round off single and multiple digit numbers to complete a task.	X	X	
Using Fractions.			
o Read, write common fractions to complete a task.			
• Add, Subtract, multiply, divide common fractions to solve problems.			
Using decimals.			
o Carry out arithmetic computations involving dollars and cents.			
o Read and write decimals to one and more places to complete a task.	X	X	X

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - BGM Operator

	Critical Tasks		
Computation Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Using decimals.			
• Round off decimals to one and more places to complete a task.	X	X	
• Add, subtract decimals to one and more places to solve a problem.	X	X	
Using percents.			
o Read, write, compute percents to complete a task.	X	X	X
Performing mixed operations.			
• Convert fractions to decimals, percents to fractions, fractions to percents, percents to decimals, common fractions or mixed numbers to decimal fractions, and decimal fractions to common fractions or mixed numbers to complete a task.	X		
• Solve problems by selecting and using correct order of operations.	X	X	
o Compute averages, ranges or ratios to complete a task.			

* Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircon - BGM Operator

Critical Tasks

	Read & Understand		Preparing
	Process		For & Using
Computation Skills:	Documents	Chart Data	Automation
Measurements and calculation.			
• Read numbers or symbols from time, weight, distance and volume measuring scales.	X	X	X
• Use measuring device to determine an object's weight, distance or volume	X	X	
• Perform basic metric measurements involving weight, distance, and volume.	X	X	
• Use calculator to perform basic arithmetic operations to solve problems.	X	X	X
Estimations.			
• Determine if a solution to a mathematical problem is reasonable.	X	X	

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - BGM Operator

Critical Tasks

Reading Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Vocabulary			
o Recognize common words and meanings, task-related words with technical meanings, or meanings of common abbreviations and acronyms.	X	X	
Literal Comprehension			
o Identifying factual details and specifications.	X		
o Follow sequential directions to complete a task.	X	X	
o Determine the main idea of a paragraph or section.			
Locating information within a text			
o Use table of contents, indexes, appendices, glossary, systems or sub systems.			
o Locate pages, titles, paragraphs, figures, charts needed to answer questions or solve problems.	X	X	
o Skim or scan to determine whether or not text contains relevant information.	X	X	
o Cross-reference within and across source materials to select information to perform a routine.	X	X	
o Use a completed form to locate information to complete a task.	X	X	

Applied Basic Skills Analysis
Zircoa - BGM Operator

Critical Tasks

Reading Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Comparing and contrasting			
o Combine information from multiple sources that contribute to the completion of a task.	X	X	
o Select part of text or visual materials to complete a task.	X	X	
o Identify similarities and differences in objects.	X	X	
o Determine the presence of a defect or extent of damage.	X	X	
o Classify or match objects by color, size, or significant marking.	X	X	
o Distinguish between relevant and irrelevant information in text or visuals.	X	X	
Recognizing cause and effect; predicting outcomes.			
o Use common knowledge for safety.	X		X
o Apply preventative measures prior to a task to minimize problems.	X		
o Select appropriate course of action in emergency.	X		
Using charts, diagrams, schematics			
o Read two or more column charts to obtain information.	X	X	

Applied Basic Skills Analysis
Zircoa - BGM Operator

Critical Tasks

Reading Skills:	Read & Understand		Preparing
	Process		For & Using
	Documents	Chart Data	Automation
o Apply information from tables or graphs to locate malfunctions or select actions.	X	X	
o Use flow charts to sequence events, arrive at a decision, or problem solve.	X		
o Identify component within a schematic.			
o Isolate problem components in schematics, trace to cause of problem, and interpret symbols.			
o Identify details, labels, numbers, parts of an illustration, parts from a key or legend.	X	X	
o Follow sequence illustrations as a guide.			
o Interpret three-dimensional drawings of objects for assembly or disassembly.			
Inferential comprehension.			
o Determine meaning of figurative, idiomatic, or technical usage of terms, using context clues as reference.			
o Make inferences from text.			
o Organize information from multiple sources into a series.	X	X	
o Interpret codes and symbols.	X	X	

Applied Basic Skills Analysis
Zircoa - BGM Operator

	Critical Tasks		
Communication Skills:	**Read & Understand Process Documents**	**Chart Data**	**Preparing For & Using Automation**
o Understand and write process documents	X		
o Fill out forms with data and comments	X	X	
o Communicate verbally with other team and department members	X	X	
o Use basic keyboarding skills			

JOB ANALYSIS SUMMARY SHEET

COMPANY: ZIRCOA

JOB TITLE: FINE GRAIN BATCH MIXER

BASIC COMPUTATION SKILLS REQUIRED:

Must be able to: perform whole number operations; use fractions; use decimals; use percents; perform mixed operations; perform measurement and use in calculations; make estimations.

BASIC READING SKILLS REQUIRED:

Must be able to: recognize and use task-related words with technical meanings, or meanings of common abbreviations and acronyms; identify factual details; follow sequential directions; locate information; cross-reference within and across source materials; use completed forms; combine information from multiple sources; select part of text or visual materials; identify similarities and differences; determine presence of defect or damage; classify or match objects; distinguish between relevant and irrelevant information; recognize cause and effect; predict outcomes; use charts, diagrams, and schematics; make inferences.

BASIC COMMUNICATION SKILLS REQUIRED:

Must be able to: understand and write process documentation; fill out forms with data and comments; communicate verbally with other team and department members; future use of basic keyboarding skills.

BASIC SKILL LEVELS REQUIRED FOR **ZIRCOA FINE GRAIN BATCH MIXER**:

Computational skill level:	8.9
Reading/communications skill level:	10.7

10/6/92

Applied Basic Skills Analysis
Zircoa - Fine Grain Batch Mixer

Company Zircoa

Date 8/27/92

Employee Name William "Burleigh" Maple

Job Title Fine Grain Batch Mixer

Supervisor Eric Van Horn

Critical Tasks

Computation Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Performing whole number operations.			
o Read, write, count single digit and multiple digit whole numbers to complete a task.	X	X	
o Add, subtract, multiply, divide single and multiple digit numbers to complete a task.	X	X	
• Use addition, subtraction, multiplication and division to solve problems with single and multiple digit numbers.	X	X	
• Round off single and multiple digit numbers to complete a task.		X	
Using Fractions.			
o Read, write common fractions to complete a task.	X	X	
• Add, Subtract, multiply, divide common fractions to solve problems.		X	
Using decimals.			
o Carry out arithmetic computations involving dollars and cents.			
o Read and write decimals to one and more places to complete a task.	X	X	

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - Fine Grain Batch Mixer

Critical Tasks

Computation Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Using decimals.			
• Round off decimals to one and more places to complete a task.	X	X	
• Add, subtract, multiply and divide to one and more places to solve a problem.	X	X	
Using percents.			
o Read, write, compute percents to complete a task.	X	X	
Performing mixed operations.			
• Convert fractions to decimals, percents to fractions, fractions to percents, percents to decimals, common fractions or mixed numbers to decimal fractions, and decimal fractions to common fractions or mixed numbers to complete a task.	X	X	
• Solve problems by selecting and using correct order of operations.	X	X	
o Compute averages, ranges or ratios to complete a task.	X	X	

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - Fine Grain Batch Mixer

Critical Tasks

Computation Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Measurements and calculation.			
• Read numbers or symbols from time, weight, distance and volume measuring scales.	X	X	
• Use measuring device to determine an object's weight, distance or volume.	X	X	
• Perform basic metric conversions involving weight, distance, and volume.		X	
• Use calculator to perform basic arithmetic operations to solve problems.		X	
Estimations.			
• Determine if a solution to a mathematical problem is reasonable.	X	X	

- Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - Fine Grain Batch Mixer

Critical Tasks

Reading Skills:	Read & Understand		Preparing
	Process		For & Using
	Documents	Chart Data	Automation
Vocabulary			
o Recognize common words and meanings, task-related words with technical meanings, or meanings of common abbreviations and acronyms.	X	X	X
Literal Comprehension			
o Identifying factual details and specifications.	X	X	X
o Follow sequential directions to complete a task.	X	X	X
o Determine the main idea of a paragraph or section.	X	X	X
Locating information within a text			
o Use a table of contents, index, appendices, glossary, systems or sub systems.			X
o Locate pages, titles, paragraphs, figures, charts needed to answer questions or solve problems.	X	X	X
o Skim or scan to determine whether or not text contains relevant information.	X	X	X
o Cross-reference within and across source materials to select information to perform a routine.	X	X	X
o Use a completed form to locate information to complete a task.	X	X	X

Applied Basic Skills Analysis
Zircoa - Fine Grain Batch Mixer

	Critical Tasks		
Reading Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Comparing and contrasting			
o Combine information from multiple sources that contribute to the completion of a task.	X	X	X
o Select part of text or visual materials to complete a task.	X	X	
o Identify similarities and differences in objects.	X	X	
o Determine the presence of a defect or extent of damage.	X	X	
o Classify or match objects by color, size, or significant marking.	X	X	
o Distinguish between relevant and irrelevant information in text or visuals.	X	X	X
Recognizing cause and effect; predicting outcomes.			
o Use common knowledge for safety.	X		X
o Apply preventative measures prior to a task to minimize problems.	X		X
o Select appropriate course of action in emergency.	X		X
Using charts, diagrams, schematics			
o Read two or more column charts to obtain information.	X	X	X

Applied Basic Skills Analysis
Zircoa - Fine Grain Batch Mixer

Critical Tasks

Reading Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
o Apply information from tables or graphs to locate malfunctions or select actions.	X	X	
o Use flow charts and organizational charts to sequence events, arrive at a decision, or problem solve.	X	X	
o Identify components within a schematic.			
o Isolate problem components in schematics, trace to cause a problem, and interpret symbols.			
o Identify details, labels, numbers, parts of an illustration, parts from a key or legend.	X	X	
o Follow sequence illustrations as a guide.			
o Interpret three-dimensional drawings of objects for assembly or disassembly.			
Inferential comprehension.			
o Determine meaning of figurative, idiomatic, or technical usage of terms, using context clues as reference.	X	X	X
o Make inferences from text.	X	X	X
o Organize information from multiple sources into a series.	X	X	
o Interpret codes and symbols.	X	X	X

Applied Basic Skills Analysis
Zircoa - Fine Grain Batch Mixer

Critical Tasks

Communication Skills:	**Read & Understand Process Documents**	**Chart Data**	**Preparing For & Using Automation**
o Understand and write process documents	X	X	X
o Fill out forms with data and comments	X	X	
o Communicate verbally with other team and department members	X	X	X
o Use basic keyboarding skills		X	

JOB ANALYSIS SUMMARY SHEET

COMPANY: ZIRCOA

JOB TITLE: GRAIN PLANT OPERATOR/SHIFT LEADER

BASIC COMPUTATION SKILLS REQUIRED:

Must be able to: perform whole number operations; use decimals; use percents; perform mixed operations not including fractions; perform measurements and use in calculations; make estimations.

BASIC READING SKILLS REQUIRED:

Must be able to: recognize and use task-related words with technical meanings, or meanings of common abbreviations and acronyms; identify factual details; follow sequential directions; locate information; cross-reference within and across source materials; use completed forms; combine information from multiple sources; select part of text or visual materials; determine presence of defect or damage; distinguish between relevant and irrelevant information; recognize cause and effect; predict outcomes; use charts, diagrams, and schematics; make inferences.

BASIC COMMUNICATION SKILLS REQUIRED:

Must be able to: understand and write process documentation; fill out forms with data and comments; communicate verbally with other departments; future use of basic keyboarding skills.

BASIC SKILL LEVELS REQUIRED FOR **ZIRCOA GRAIN PLANT OPERATOR**:

Computational skill level:	8.9
Reading/communications skill level:	10.7

10/6/92

Applied Basic Skills Analysis
Zircoa - Grain Plant Operator

Company Zircoa

Date 8/27/92

Employee Name Steve Gaylord

Job Title Grain Plant Operator/Shift Leader

Supervisor Garth Austen

Critical Tasks

Computation Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Performing whole number operations.			
o Read, write, count single digit and multiple digit whole numbers to complete a task.	X	X	
o Add, subtract, multiply divide single and multiple digit numbers to complete a task.	X	X	
• Use addition, subtraction, multiplication and division to solve problems with single and multiple digit numbers.	X	X	
• Round off single and multiple digit numbers to complete a task.	X	X	
Using decimals.			
o Carry out arithmetic computations involving dollars and cents.			
o Read and write decimals to one and more places to complete a task.	X	X	

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - Grain Plant Operator

Critical Tasks

Computation Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Using decimals.			
• Round off decimals to one and more places to complete a task.	X	X	
• Add, subtract, multiply and divide decimals to one and more places to solve a problem.	X	X	
Using percents.			
o Read, write, compute percents to complete a task.	X	X	
Performing mixed operations.			
• Convert percents to decimals and complete a task.	X	X	
• Solve problems by selecting and using correct order of operations.	X	X	
o Compute averages, ranges or ratios to complete a task.	X	X	

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - Grain Plant Operator

Critical Tasks

Computation Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Measurements and calculation.			
• Read numbers or symbols from time, weight, distance and volume measuring scales.	X	X	
• Use measuring device to determine an object's weight, distance or volume	X	X	
• Use calculator to perform basic arithmetic operations to solve problems.	X	X	
Estimations.			
• Determine if a solution to a mathematical problem is reasonable.	X	X	

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - Grain Plant Operator

Critical Tasks

Reading Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Vocabulary			
o Recognize common words and meanings, task-related words with technical meanings, or meanings of common abbreviations and acronyms.	X	X	
Literal Comprehension			
o Identifying factual details and specifications within text.	X	X	
o Follow sequential directions to complete a task.	X	X	
o Determine the main idea of a paragraph or section.	X		
Locating Information within a text			
o Use table of contents, indexes, appendices, glossary, systems or sub systems.	X	X	
o Locate pages, titles, paragraphs, figures, charts needed to answer questions or solve problems.	X	X	
o Skim or scan to determine whether or not text contains relevant information.	X	X	
o Cross-reference within and across source materials to select information to perform a routine.	X	X	
o Use a completed form to locate information to complete a task.	X	X	

Applied Basic Skills Analysis
Zircoa - Grain Plant Operator

Critical Tasks

Reading Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Comparing and contrasting			
o Combine information from multiple sources that contribute to the completion of a task.	X	X	
o Select part of text or visual materials to complete a task.	X	X	
o Identify similarities and differences in objects.			
o Determine the presence of a defect or extent of damage.	X	X	
o Distinguish between relevant and irrelevant information in text or visuals.	X	X	
Recognizing cause and effect; predicting outcomes.			
o Use common knowledge for safety.	X	X	
o Apply preventative measures prior to a task to minimize problems.	X	X	
o Select appropriate course of action in emergency.	X	X	
Using charts, diagrams, schematics			
o Read two or more column charts to obtain information.	X	X	

Applied Basic Skills Analysis
Zircoa - Grain Plant Operator

Critical Tasks

Reading Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
o Apply information from tables or graphs to locate malfunctions or select actions.	X	X	
o Use flow charts and organizational charts to sequence events, arrive at a decision, or problem solve.	X		
o Identify component within a schematic.	X		
o Isolate problem components in schematics, trace to cause of problem, and interpret symbols.	X		
o Identify details, labels, numbers, parts of an illustration, parts from a key or legend.	X	X	
o Follow sequence illustrations as a guide.	X		
Inferential comprehension.			
o Determine meaning of figurative, idiomatic, or technical usage of terms, using context clues as reference.	X	X	
o Make inferences from text.	X		
o Organize information from multiple sources into a series.	X	X	
o Interpret codes and symbols.	X	X	

Applied Basic Skills Analysis
Zircoa - Grain Plant Operator

Critical Tasks

Communication Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
o Understand and write process documents	X		
o Fill out forms with data and comments		X	
o Communicate verbally with other team and department members	X	X	
o Use basic keyboarding skills	X		X

JOB ANALYSIS SUMMARY SHEET

COMPANY: ZIRCOA

JOB TITLE: KILN OPERATOR/LOADER

BASIC COMPUTATION SKILLS REQUIRED:

Must be able to: perform whole number operations; read and write decimals; compute averages; use calculator; make estimations.

BASIC READING SKILLS REQUIRED:

Must be able to: recognize and use task-related words with technical meanings, or meanings of common abbreviations and acronyms; identify factual details; follow sequential directions; locate information; skim and scan forms; use completed forms to locate information to complete a task; compare and contrast information ; combine information from multiple sources; select part of text or visual materials; identify similarities and differences; distinguish between relevant and irrelevant information; recognize cause and effect; predict outcomes; use charts to sequence events; identify components within a manual or schematic; make inferences and interpret codes and symbols.

BASIC COMMUNICATION SKILLS REQUIRED:

Must be able to: understand and write process documentation; fill out forms with data and comments; communicate verbally with other team members.

BASIC SKILL LEVELS REQUIRED FOR **ZIRCOA KILN OPERATOR/LOADER** :

Computational skill level:	8.9
Reading/communications skill level:	8.9

10/6/92

Applied Basic Skills Analysis
Zircoa - Kiln Operator/Loader

Company Zircoa

Date 8/27/92

Employee Name Gerald Thomas (Henry Bishop)

Job Title Kiln Operator/Loader

Supervisor Dick Funk; Stan Piekos, Kiln Technician

Critical Tasks

Computation Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Performing whole number operations.			
o Read, write, count single digit and multiple digit whole numbers to complete a task.	X	X	X
o Add, subtract, multiply, divide single and multiple digit numbers to complete a task.	X	X	X
• Use addition, subtraction, multiplication and division to solve problems with single and multiple digit numbers.	X	X	
• Round off single and multiple digit numbers to complete a task.	X	X	
Using Fractions.			
o Read, write common fractions to complete a task.			
• Add, Subtract, multiply, divide common fractions to solve problems.			
Using decimals.			
o Carry out arithmetic computations involving dollars and cents.			
o Read and write decimals to one and more places to complete a task.	X	X	X

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - Kiln Operator/Loader

Critical Tasks

Computation Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Using decimals.			
• Round off decimals to one and more places to complete a task.	X	X	X
• Add, subtract, multiply and divide to one and more places to solve a problem.	X	X	X
Using percents.			
o Read, write, compute percents to complete a task.			
Performing mixed operations.			
• Convert fractions to decimals, percents to fractions, fractions to percents, percents to decimals, common fractions or mixed numbers to decimal fractions, and decimal fractions to common fractions or mixed numbers to complete a task.			
• Solve problems by selecting and using correct order of operations.	X	X	X
o Compute averages, ranges or ratios to complete a task.	X	X	

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - Kiln Operator/Loader

Critical Tasks

	Read & Understand		Preparing
	Process		For & Using
Computation Skills:	Documents	Chart Data	Automation
Measurements and calculation.			
• Read numbers or symbols from time, weight, distance and volume measuring scales.	X	X	X
• Use measuring device to determine an object's weight, distance or volume.			
• Perform basic metric conversions involving weight, distance, and volume.			
• Use calculator to perform basic arithmetic operations to solve problems.	X	X	
Estimations.			
• Determine if a solution to a mathematical problem is reasonable.	X	X	

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - Kiln Operator/Loader

Critical Tasks

Reading Skills:	**Read & Understand Process Documents**	**Chart Data**	**Preparing For & Using Automation**
Vocabulary			
o Recognize common words and meanings, task-related words with technical meanings, or meanings of common abbreviations and acronyms.	X	X	
Literal Comprehension			
o Identifying factual details and specifications.	X		
o Follow sequential directions to complete a task.	X	X	
o Determine the main idea of a paragraph or section.	X		
Locating information within a text			
o Use a table of contents, index, appendices, glossary, systems or sub systems.	X		
o Locate pages, titles, paragraphs, figures, charts needed to answer questions or solve problems.	X		
o Skim or scan to determine whether or not text contains relevant information.	X	X	
o Cross-reference within and across source materials to select information to perform a routine.			
o Use a completed form to locate information to complete a task.	X	X	

Applied Basic Skills Analysis
Zircoa - Kiln Operator/Loader

	Critical Tasks		
Reading Skills:	**Read & Understand Process Documents**	**Chart Data**	**Preparing For & Using Automation**
Comparing and contrasting			
o Combine information from multiple sources that contribute to the completion of a task.	X	X	
o Select part of text or visual materials to complete a task.	X	X	
o Identify similarities and differences in objects.	X		
o Determine the presence of a defect or extent of damage.			
o Classify or match objects by color, size, or significant marking.	X		
o Distinguish between relevant and irrelevant information in text or visuals.	X	X	
Recognizing cause and effect; predicting outcomes.			
o Use common knowledge for safety.	X		X
o Apply preventative measures prior to a task to minimize problems.	X		X
o Select appropriate course of action in emergency.	X		X
Using charts, diagrams, schematics			
o Read two or more column charts to obtain information.	X	X	X

Applied Basic Skills Analysis
Zircoa - Kiln Operator/Loader

Critical Tasks

Reading Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
o Apply information from tables or graphs to locate malfunctions or select actions.	X		
o Use flow charts to sequence events, arrive at a decision, or problem solve.	X	X	
o Identify components within a schematic.	X		
o Isolate problem components in schematics, trace to cause a problem, and interpret symbols.	X		
o Identify details, labels, numbers, parts of an illustration, parts from a key or legend.	X		
o Follow sequence illustrations as a guide.			
o Interpret three-dimensional drawings of objects for assembly or disassembly.			
Inferential comprehension.			
o Determine meaning of figurative, idiomatic, or technical usage of terms, using context clues as reference.	X	X	
o Make inferences from text.			
o Organize information from multiple sources into a series.	X	X	
o Interpret codes and symbols.	X	X	

Applied Basic Skills Analysis
Zircoa - Kiln Operator/Loader

Critical Tasks

Communication Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
o Understand and write process documents	X		
o Fill out forms with data and comments	X	X	
o Communicate verbally with other team and department members	X	X	X
o Use basic keyboarding skills			

JOB ANALYSIS SUMMARY SHEET

COMPANY: ZIRCOA

JOB TITLE: MACHINIST CLASS 'A'

BASIC COMPUTATION SKILLS REQUIRED:

Must be able to: perform whole number operations; use fractions; use decimals; use percents; perform mixed operations; perform measurement and use in calculations; make estimations.

Additional skills required beyond basics: shop geometry and shop trigonometry.

BASIC READING SKILLS REQUIRED:

Must be able to: recognize and use task-related words with technical meanings, or meanings of common abbreviations and acronyms; identify factual details; follow sequential directions; locate information; cross-reference within and across source materials; use completed forms; combine information from multiple sources; select part of text or visual materials; identify similarities and differences; determine presence of defect or damage; classify or match objects; distinguish between relevant and irrelevant information; recognize cause and effect; predict outcomes; use charts, diagrams, and schematics; make inferences.

BASIC COMMUNICATION SKILLS REQUIRED:

Must be able to: understand and write process documentation; fill out forms with data and comments; communicate verbally with other team members; use basic keyboarding skills.

BASIC SKILL LEVELS REQUIRED FOR ZIRCOA MACHINIST CLASS 'A':

Computational skill level:	8.9+
Reading/communications skill level:	9.7

10/6/92

Applied Basic Skills Analysis
Zircoa - Machinist Class 'A'

Company Zircoa

Date 8/27/92 10:30 - 11:30 AM

Employee Name Ron Finley; Supervisor: Jim Kacludis

Job Title Machinist Class 'A'

Critical Tasks

Computation Skills:	Read & Understand Process Documents	Charting Data	Preparing For & Using Automation
Performing whole number operations.			
o Read, write, count single digit and multiple digit whole numbers to complete a task.	X	X	X
o Add, subtract, multiply divide single and multiple digit numbers to complete a task.	X	X	X
• Use addition, subtraction, multiplication and division to solve problems with single and multiple digit numbers.	X	X	X
• Round off single and multiple digit numbers to complete a task.	X	X	
Using Fractions.			
o Read, write common fractions to complete a task.	X		
• Add, Subtract, multiply, divide common fractions to solve problems.	X		
Using decimals.			
o Carry out arithmetic computations involving dollars and cents.	X		
o Read and write decimals to one and more places to complete a task.	X	X	X

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - Machinist Class 'A'

Critical Tasks

Computation Skills:	Read & Understand Process Documents	Charting Data	Preparing For & Using Automation
Using decimals.			
• Round off decimals to one and more places to complete a task.	X	X	X
• Add, subtract, multiply and divide decimals to one and more places to solve a problem.	X	X	X
Using percents.			
o Read, write, compute percents to complete a task.	X	X	
Performing mixed operations.			
• Convert percents to decimals and complete a task.	X	X	X
• Solve problems by selecting and using correct order of operations.	X	X	X
o Compute averages, ranges or ratios to complete a task.	X	X	X

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - Machinist Class 'A'

Critical Tasks

Computation Skills:	**Read & Understand Process Documents**	**Charting Data**	**Preparing For & Using Automation**
Measurements and calculation.			
• Read numbers or symbols from time, weight, distance and volume measuring scales.	X	X	X
• Use measuring device to determine an object's weight, distance or volume	X	X	X
• Use calculator to perform basic arithmetic operations to solve problems.	X	X	X
Estimations.			
• Determine if a solution to a mathematical problem is reasonable.	X	X	X
∇ Basic Trigonometry.	X		

∇ Not a basic skill covered by NWLP Grant training.

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - Machinist Class 'A'

Critical Tasks

Reading Skills:	Read & Understand Process Documents	Charting Data	Preparing For & Using Automation
Vocabulary			
o Recognize common words and meanings, task-related words with technical meanings, or meanings of common abbreviations and acronyms.	X	X	X
Literal Comprehension			
o Identifying factual details and specifications within text.	X	X	X
o Follow sequential directions to complete a task.	X	X	X
o Determine the main idea of a paragraph or section.	X		X
Locating information within a text			
o Use table of contents, indexes, appendices, glossary, systems or sub systems.	X		X
o Locate pages, titles, paragraphs, figures, charts needed to answer questions or solve problems.	X	X	X
o Skim or scan to determine whether or not text contains relevant information.	X	X	X
o Cross-reference within and across source materials to select information to perform a routine.	X	X	X
o Use a completed form to locate information to complete a task.	X	X	X

Applied Basic Skills Analysis
Zircoa - Machinist Class 'A'

Critical Tasks

Reading Skills:	Read & Understand Process Documents	Charting Data	Preparing For & Using Automation
Comparing and contrasting			
o Combine information from multiple sources that contribute to the completion of a task.	X	X	X
o Select part of text or visual materials to complete a task.	X	X	X
o Identify similarities and differences in objects.	X	X	X
o Determine the presence of a defect or extent of damage.	X	X	X
o Classify or match objects by color, size, or significant marking.	X	X	X
o Distinguish between relevant and irrelevant information in text or visuals.	X	X	X
Recognizing cause and effect; predicting outcomes.			
o Use common knowledge for safety.	X		X
o Apply preventative measures prior to a task to minimize problems.	X		X
o Select appropriate course of action in emergency.	X		X
Using charts, diagrams, schematics			
o Read two or more column charts to obtain information.	X	X	X

Applied Basic Skills Analysis
Zircon - Machinist Class 'A'

Critical Tasks

Reading Skills:	Read & Understand Process Documents	Charting Data	Preparing For & Using Automation
o Apply information from tables or graphs to locate malfunctions or select actions.	X	X	X
o Use flow charts and organizational charts to sequence events, arrive at a decision, or problem solve.	X	X	X
o Identify component within a schematic.	X		X
o Isolate problem components in schematics, trace to cause of problem, and interpret symbols.	X		X
o Identify details, labels, numbers, parts of an illustration, parts from a key or legend.	X	X	X
o Follow sequence illustrations as a guide.	X	X	X
o Interpret three-dimensional drawings of objects for assembly or disassembly.	X		X
Inferential comprehension.			
o Determine meaning of figurative, idiomatic, or technical usage of terms, using context clues as reference.	X	X	X
o Make inferences from text.	X		X
o Organize information from multiple sources into a series.	X	X	X
o Interpret codes and symbols.	X	X	X

Applied Basic Skills Analysis
Zircoa - Machinist Class 'A'

Critical Tasks

Communication Skills:	Read & Understand Process Documents	Charting Data	Preparing For & Using Automation
o Basic Keyboarding Skills		X	X
o Process Writing	X		
o Filling out forms with data & comments		X	
o Verbal communication with other team members.	X	X	X

JOB ANALYSIS SUMMARY SHEET

COMPANY: ZIRCOA

JOB TITLE: MAINTENANCE TRADESWORKER

BASIC COMPUTATION SKILLS REQUIRED:

Must be able to: perform whole number operations; use fractions; use decimals; perform mixed operations; perform measurement and use in calculations; make estimations.

BASIC READING SKILLS REQUIRED:

Must be able to: recognize and use task-related words with technical meanings, or meanings of common abbreviations and acronyms; identify factual details; follow sequential directions; locate information; cross-reference within and across source materials; use completed forms; combine information from multiple sources; select part of text or visual materials; identify similarities and differences; determine presence of defect or damage; classify or match objects; distinguish between relevant and irrelevant information; recognize cause and effect; predict outcomes; use charts, diagrams, and schematics; make inferences.

BASIC COMMUNICATION SKILLS REQUIRED:

Must be able to: understand and write process documentation; fill out forms with data and comments; communicate verbally with other team and department members; future use of basic keyboarding skills.

BASIC SKILL LEVELS REQUIRED FOR **ZIRCOA MAINTENANCE TRADESWORKER**:

Computational skill level: 8.9
Reading/communications skill level: 13.2

10/6/92

Applied Basic Skills Analysis
Zircoa - Maintenance Tradesworker

Company Zircoa

Date 8/27/92 8-10am

Employee Name Gary Kalinoff; Supervisor: Steve Fedyna

Job Title Maintenance Tradesworker

Critical Tasks

Computation Skills:	**Read & Understand Process Documents**	**Chart Data**	**Preparing For & Using Automation**
Performing whole number operations.			
o Read, write, count single digit and multiple digit whole numbers to complete a task.	X		X
o Add, subtract, multiply divide single and multiple digit numbers to complete a task.	X		X
• Use addition, subtraction, multiplication and division to solve problems with single and multiple digit numbers.	X		
• Round off single and multiple digit numbers to complete a task.	X		X
Using fractions.			
o Read, write common fractions to complete a task.	X		
• Add, subtract, multiply, divide common fractions to solve problems.	X		
Using decimals.			
o Read and write decimals to one and more places to complete a task.	X		X

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - Maintenance Tradesworker

Critical Tasks

Computation Skills:	Read & Understand Process Documents	Charting Data	Preparing For & Using Automation
Using decimals.			
• Round off decimals to one and more places to complete a task.	X		X
• Add, subtract, multiply and divide decimals to one and more places to solve a problem.	X		
Performing mixed operations.			
• Convert fractions to decimals, common fractions or mixed numbers to decimal fractions, and decimal fractions to common fractions or mixed numbers to complete a task.	X		X
• Solve problems by selecting and using correct order of operations.	X		

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - Maintenance Tradesworker

	Critical Tasks		
Computation Skills:	Read & Understand Process Documents	Charting Data	Preparing For & Using Automation
Measurements and calculation.			
• Read numbers or symbols from time, weight, distance and volume measuring scales.	X		
• Use measuring device to determine an object's weight, distance or volume	X		
• Perform basic metric conversions involving weight, distance, and volume.	X		
• Use calculator to perform basic arithmetic operations to solve problems.	X		X
Estimations.			
• Determine if a solution to a mathematical problem is reasonable.	X		X

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - Maintenance Tradesworker

Critical Tasks

Reading Skills:	Read & Understand Process Documents	Charting Data	Preparing For & Using Automation
Vocabulary			
o Recognize common words and meanings, task-related words with technical meanings, or meanings of common abbreviations and acronyms.	X	X	X
Literal Comprehension			
o Identifying factual details and specifications within text.	X	X	X
o Follow sequential directions to complete a task.	X	X	X
o Determine the main idea of a paragraph or section.	X		
Locating Information			
o Use table of contents, indexes, appendices, glossary, systems or sub systems.	X	X	X
o Locate pages, titles, paragraphs, figures, charts needed to answer questions or solve problems.	X	X	X
o Skim or scan to determine whether or not text contains relevant information.	X	X	X
o Cross-reference within and across source materials to select information to perform a routine.	X	X	X
o Use a completed form to locate information to complete a task.	X	X	X

Applied Basic Skills Analysis
Zircoa - Maintenance Tradesworker

Critical Tasks

Reading Skills:	Reading & Understanding Process Documents	Charting Data	Preparing For & Using Automation
Comparing and contrasting			
o Combine information from multiple sources that contribute to the completion of a task.	X	X	X
o Select part of text or visual materials to complete a task.	X	X	X
o Identify similarities and differences in objects.	X	X	X
o Determine the presence of a defect or extent of damage.	X	X	X
o Classify or match objects by color, size, or significant marking.	X	X	X
o Distinguish between relevant and irrelevant information in text or visuals.	X	X	X
Recognizing cause and effect; predicting outcomes.			
o Use common knowledge for safety.	X		X
o Apply preventative measures prior to a task to minimize problems.	X		X
o Select appropriate course of action in emergency.	X		X
Using charts, diagrams, schematics			
o Read two or more column charts to obtain information.	X	X	X

Applied Basic Skills Analysis
Zircoa - Maintenance Tradesworker

Critical Tasks

Reading Skills:	Reading & Understanding Process Documents	Charting Data	Preparing For & Using Automation
o Apply information from tables or graphs to locate malfunctions or select actions.	X	X	X
o Identify component within a schematic.	X		X
o Isolate problem components in schematics, trace to cause of problem, and interpret symbols.	X		X
o Identify details, labels, numbers, parts of an illustration, parts from a key or legend.	X	X	X
o Follow sequence illustrations as a guide.	X		
o Interpret three-dimensional drawings of objects for assembly or disassembly.	X		
Inferential comprehension.			
o Determine meaning of figurative, idiomatic, or technical usage of terms, using context clues as reference.	X	X	X
o Make inferences from text.	X	X	X
o Organize information from multiple sources into a series.	X	X	
o Interpret codes and symbols.	X	X	X

Applied Basic Skills Analysis
Zircoa - Maintenance Tradesworker

Critical Tasks

Communication Skills:	Reading & Understanding Process Documents	Charting Data	Preparing For & Using Automation
o Basic Keyboarding Skills	X		
o Process Writing	X		
o Filling out forms with data & comments		X	
o Verbal communication with other team members	X	X	

JOB ANALYSIS SUMMARY SHEET

COMPANY: ZIRCOA

JOB TITLE: PACKER/INSPECTOR/LOADER

BASIC COMPUTATION SKILLS REQUIRED:

Must be able to: perform whole number operations; use fractions; use decimals; perform mixed operations; perform measurement and use in calculations; make estimations.

BASIC READING SKILLS REQUIRED:

Must be able to: recognize and use task-related words with technical meanings, or meanings of common abbreviations and acronyms; identify factual details; follow sequential directions; locate information; cross-reference within and across source materials; use completed forms; combine information from multiple sources; select part of text or visual materials; identify similarities and differences; determine presence of defect or damage; classify or match objects; distinguish between relevant and irrelevant information; recognize cause and effect; predict outcomes; use charts, diagrams, and schematics; make inferences.

BASIC COMMUNICATION SKILLS REQUIRED:

Must be able to: understand and write process documentation; fill out forms with data and comments; communicate verbally with other team members; future use of basic keyboarding skills.

BASIC SKILL LEVELS REQUIRED FOR ZIRCOA PACKER/INSPECTOR/LOADER:

Computational skill level:	8.9
Reading/communications skill level:	8.8

10/8/92

Applied Basic Skills Analysis
Zircoa - Packer/Inspector/Loader

Company Zircoa

Date 8/28/92

Employee Name Janice Higinbotham (Betty Ataman, Glen Early)

Job Title Packer/Inspector/Loader

Supervisor Dick Funk

Critical Tasks

Computation Skills:	**Read & Understand Process Documents**	**Chart Data**	**Preparing For & Using Automation**
Performing whole number operations.			
o Read, write, count single digit and multiple digit whole numbers to complete a task.	X	X	X
o Add, subtract, multiply divide single and multiple digit numbers to complete a task.	X	X	
• Use addition, subtraction, multiplication and division to solve problems with single and multiple digit numbers.	X	X	
• Round off single and multiple digit numbers to complete a task.	X	X	X
Using Fractions.			
o Read, write common fractions to complete a task.	X		
• Add, Subtract, multiply, divide common fractions to solve problems.			
Using decimals.			
o Carry out arithmetic computations involving dollars and cents.			
o Read and write decimals to one and more places to complete a task.	X	X	X

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - Packer/Inspector/Loader

Critical Tasks

Computation Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Using decimals.			
• Round off decimals to one and more places to complete a task.	X	X	X
• Add, subtract, multiply and divide to one and more places to solve a problem.	X	X	
Using percents.			
o Read, write, compute percents to complete a task.			
Performing mixed operations.			
• Convert fractions to decimals, common fractions or mixed numbers to decimal fractions, and decimal fractions to common fractions or mixed numbers to complete a task.	X	X	
• Solve problems by selecting and using correct order of operations.		X	
o Compute averages, ranges or ratios to complete a task.		X	

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - Packer/Inspector/Loader

Critical Tasks

Computation Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Measurements and calculation.			
• Read numbers or symbols from time, weight, distance and volume measuring scales.	X	X	X
• Use measuring device to determine an object's weight, distance or volume.	X	X	X
• Use of metric measurement (not conversion).	X	X	
• Use calculator to perform basic arithmetic operations to solve problems.	X	X	X
Estimations.			
• Determine if a solution to a mathematical problem is reasonable.	X	X	X

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircon - Packer/Inspector/Loader

Critical Tasks

Reading Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Vocabulary			
o Recognize common words and meanings, task-related words with technical meanings, or meanings of common abbreviations and acronyms.	X	X	X
Literal Comprehension			
o Identifying factual details and specifications.	X		
o Follow sequential directions to complete a task.	X		
o Determine the main idea of a paragraph or section.	X		
Locating information within a text			
o Use a table of contents, index, appendices, glossary, systems or sub systems.	X		
o Locate pages, titles, paragraphs, figures, charts needed to answer questions or solve problems.	X	X	
o Skim or scan to determine whether or not text contains relevant information.	X		
o Cross-reference within and across source materials to select information to perform a routine.	X		
o Use a completed form to locate information to complete a task.	X	X	X

Applied Basic Skills Analysis
Zircoa - Packer/Inspector/Loader

Critical Tasks

Reading Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Comparing and contrasting			
o Combine information from multiple sources that contribute to the completion of a task.	X		
o Select part of text or visual materials to complete a task.	X		
o Identify similarities and differences in objects.		X	X
o Determine the presence of a defect or extent of damage.		X	X
o Classify or match objects by color, size, or significant marking.		X	X
o Distinguish between relevant and irrelevant information in text or visuals.	X		
Recognizing cause and effect; predicting outcomes.			
o Use common knowledge for safety.	X		X
o Apply preventative measures prior to a task to minimize problems.	X		
o Select appropriate course of action in emergency.	X		
Using charts, diagrams, schematics			
o Read two or more column charts to obtain information.	X	X	X

Applied Basic Skills Analysis
Zircoa - Packer/Inspector/Loader

Critical Tasks

Reading Skills:	Read & Understand		Preparing
	Process		For & Using
	Documents	Chart Data	Automation
o Apply information from tables or graphs to locate malfunctions or select actions.			
o Use flow charts and organizational charts to sequence events, arrive at a decision, or problem solve.	X	X	
o Identify components within a schematic.			
o Isolate problem components in schematics, trace to cause a problem, and interpret symbols.			
o Identify details, labels, numbers, parts of an illustration, parts from a key or legend.	X	X	
o Follow sequence illustrations as a guide.			
o Interpret three-dimensional drawings of objects for assembly or disassembly.	X		
Inferential comprehension.			
o Determine meaning of figurative, idiomatic, or technical usage of terms, using context clues as reference.			
o Make inferences from text.			
o Organize information from multiple sources into a series.			
o Interpret codes and symbols.	X	X	X

Applied Basic Skills Analysis
Zircoa - Packer/Inspector/Loader

Critical Tasks

Communication Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
o Understand and write process documents	X	X	X
o Fill out forms with data and comments	X	X	
o Communicate verbally with other team and department members	X	X	X
o Use basic keyboarding skills	X		X

JOB ANALYSIS SUMMARY SHEET

COMPANY: ZIRCOA
JOB TITLE: PRESS OPERATOR

BASIC COMPUTATION SKILLS REQUIRED:

Must be able to: perform whole number operations; use decimals; perform mixed operations; perform measurement and use in calculations; make estimations.

BASIC READING SKILLS REQUIRED:

Must be able to: recognize and use task-related words with technical meanings, or meanings of common abbreviations and acronyms; identify factual details; follow sequential directions; locate information; cross-reference within and across source materials; use completed forms; combine information from multiple sources; select part of text or visual materials; identify similarities and differences; determine presence of defect or damage; classify or match objects; distinguish between relevant and irrelevant information; recognize cause and effect; predict outcomes; use charts, diagrams, and schematics; make inferences.

BASIC COMMUNICATION SKILLS REQUIRED:

Must be able to: understand and write process documentation; fill out forms with data and comments; communicate verbally with other team members; future use of basic keyboarding skills.

BASIC SKILL LEVELS REQUIRED FOR **ZIRCOA PRESS OPERATOR**:

Computational skill level: 8.9
Reading/communications skill level: 10.9

10/8/92

Applied Basic Skills Analysis
Zircoa - Press Operator

Company Zircoa
Date 8/27/92

Employee Name Marge Zaronski
Job Title Press Operator
Supervisor Tony Bobo (Tony Fisco, Press Set-Up Specialist;
Al Roberts; Tatia Carrington, Press Operator

Critical Tasks

Computation Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Performing whole number operations.			
o Read, write, count single digit and multiple digit whole numbers to complete a task.	X	X	X
o Add, subtract, multiply, divide single and multiple digit numbers to complete a task.	X	X	X
• Use addition, subtraction, multiplication and division to solve problems with single and multiple digit numbers.	X	X	X
• Round off single and multiple digit numbers to complete a task.		X	X
Using Fractions.			
o Read, write common fractions to complete a task.			
• Add, Subtract, multiply, divide common fractions to solve problems.			
Using decimals.			
o Carry out arithmetic computations involving dollars and cents.			
o Read and write decimals to one and more places to complete a task.	X		X

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircon - Press Operator

Critical Tasks

Computation Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Using decimals.			
• Round off decimals to one and more places to complete a task.	X		
• Add, subtract, multiply and divide to one and more places to solve a problem.	X	X	
Using percents.			
o Read, write, compute percents to complete a task.			
Performing mixed operations.			
• Convert fractions to decimals, percents to fractions, fractions to percents, percents to decimals, common fractions or mixed numbers to decimal fractions, and decimal fractions to common fractions or mixed numbers to complete a task.			
• Solve problems by selecting and using correct order of operations.			
o Compute averages, ranges or ratios to complete a task.	X	X	

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - Press Operator

Critical Tasks

Computation Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Measurements and calculation.			
• Read numbers or symbols from time, weight, distance and volume measuring scales.	X	X	
• Use measuring device to determine an object's weight, distance or volume.	X	X	
• Perform basic metric conversions involving weight, distance, and volume.			
• Use calculator to perform basic arithmetic operations to solve problems.			
Estimations.			
• Determine if a solution to a mathematical problem is reasonable.	X		

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - Press Operator

Critical Tasks

Reading Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Vocabulary			
o Recognize common words and meanings, task-related words with technical meanings, or meanings of common abbreviations and acronyms.	X	X	X
Literal Comprehension			
o Identifying factual details and specifications.	X		
o Follow sequential directions to complete a task.	X		
o Determine the main idea of a paragraph or section.	X		
Locating information within a text			
o Use a table of contents, index, appendices, glossary, systems or sub systems.			
o Locate pages, titles, paragraphs, figures, charts needed to answer questions or solve problems.			
o Skim or scan to determine whether or not text contains relevant information.	X		
o Cross-reference within and across source materials to select information to perform a routine.	X		
o Use a completed form to locate information to complete a task.	X		

Applied Basic Skills Analysis
Zircoa - Press Operator

Critical Tasks

Reading Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Comparing and contrasting			
o Combine information from multiple sources that contribute to the completion of a task.	X		
o Select part of text or visual materials to complete a task.	X		
o Identify similarities and differences in objects.	X		
o Determine the presence of a defect or extent of damage.	X		
o Classify or match objects by color, size, or significant marking.	X		
o Distinguish between relevant and irrelevant information in text or visuals.	X		
Recognizing cause and effect; predicting outcomes.			
o Use common knowledge for safety.	X		X
o Apply preventative measures prior to a task to minimize problems.	X		X
o Select appropriate course of action in emergency.	X		X
Using charts, diagrams, schematics			
o Read two or more column charts to obtain information.	X		

Applied Basic Skills Analysis
Zircoa - Press Operator

Critical Tasks

Reading Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
o Apply information from tables or graphs to locate malfunctions or select actions.			
o Use flow charts and organizational charts to sequence events, arrive at a decision, or problem solve.			
o Identify components within a schematic.	X		
o Isolate problem components in schematics, trace to cause a problem, and interpret symbols.			
o Identify details, labels, numbers, parts of an illustration, parts from a key or legend.	X		
o Follow sequence illustrations as a guide.	X		
o Interpret three-dimensional drawings of objects for assembly or disassembly.	X		
Inferential comprehension.			
o Determine meaning of figurative, idiomatic, or technical usage of terms, using context clues as reference.	X		
o Make inferences from text.			
o Organize information from multiple sources into a series.			
o Interpret codes and symbols.	X		

Applied Basic Skills Analysis
Zircoa - Press Operator

Critical Tasks

Communication Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
o Understand and write process documents	X		X
o Fill out forms with data and comments	X	X	
o Communicate verbally with other team and department members	X		X
o Use basic keyboarding skills	X		X

JOB ANALYSIS SUMMARY SHEET

COMPANY: ZIRCOA

JOB TITLE: SLIPCASTER / SLIPCAST SPECIALIST

BASIC COMPUTATION SKILLS REQUIRED:

Must be able to: perform whole number operations; use fractions; use decimals; perform mixed operations; perform measurement and use in calculations; make estimations; basic algebra.

BASIC READING SKILLS REQUIRED:

Must be able to: recognize and use task-related words with technical meanings, or meanings of common abbreviations and acronyms; identify factual details; follow sequential directions; locate information; skim and scan forms; cross-reference within and across source materials; use completed forms to locate information to complete a task; compare and contrast objects; combine information from multiple sources; select part of text or visual materials; identify similarities and differences; determine presence of defect or damage; distinguish between relevant and irrelevant information; recognize cause and effect; predict outcomes; use charts to sequence events; make inferences.

BASIC COMMUNICATION SKILLS REQUIRED:

Must be able to: understand and write process documentation; fill out forms with data and comments; communicate verbally with other team members.

BASIC SKILL LEVELS REQUIRED FOR **ZIRCOA SLIPCASTER/SLIPCAST SPECIALIST**:

Computational skill level:	8.9
Reading/communications skill level:	11.6

10/6/92

Applied Basic Skills Analysis
Zircoa - Slipcaster/Slip Specialist

Company Zircoa

Date 8/28/92

Employee Name Sara Ball (Carl, Slip Specialist)

Job Title Slipcaster/Slip Specialist

Supervisor Eric Van Horn - N/A

Critical Tasks

Computation Skills:	**Read & Understand Process Documents**	**Chart Data**	**Preparing For & Using Automation**
Performing whole number operations.			
o Read, write, count single digit and multiple digit whole numbers to complete a task.	X	X	
o Add, subtract, multiply divide single and multiple digit numbers to complete a task.	X	X	
• Use addition, subtraction, multiplication and division to solve problems with single and multiple digit numbers.	X	X	X
• Round off single and multiple digit numbers to complete a task.	X	X	X
Using Fractions.			
o Read, write common fractions to complete a task.			
• Add, Subtract, multiply, divide common fractions to solve problems.			
Using decimals.			
o Read and write decimals to one and more places to complete a task.	X	X	X

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - Slipcaster/Slip Specialist

Critical Tasks

Computation Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Using decimals.			
• Round off decimals to one and more places to complete a task.	X	X	
• Add, subtract decimals to one and more places to solve a problem.	X	X	
Using percents.			
o Read, write, compute percents to complete a task.	X	X	X
Performing mixed operations.			
• Convert fractions to decimals, percents to fractions, fractions to percents, percents to decimals, common fractions or mixed numbers to decimal fractions, and decimal fractions to common fractions or mixed numbers to complete a task.	X	X	
• Solve problems by selecting and using correct order of operations.	X	X	
o Compute averages, ranges or ratios to complete a task.	X	X	

- • Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - Slipcaster/Slip Specialist

Critical Tasks

Computation Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Measurements and calculation.			
• Read numbers or symbols from time, weight, distance and volume measuring scales.	X	X	X
• Use measuring device to determine an object's weight, distance or volume	X	X	X
• Perform basic metric measurements involving weight, distance, and volume.	X		
• Use calculator to perform basic arithmetic operations to solve problems.	X	X	
Estimations.			
• Determine if a solution to a mathematical problem is reasonable.	X	X	X

• Indicates skills directly involved with using problem-solving strategies or interpretation.

Applied Basic Skills Analysis
Zircoa - Slipcaster/Slip Specialist

Critical Tasks

Reading Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Vocabulary			
o Recognize common words and meanings, task-related words with technical meanings, or meanings of common abbreviations and acronyms.	X	X	
Literal Comprehension			
o Identifying factual details and specifications.	X	X	
o Follow sequential directions to complete a task.	X	X	
o Determine the main idea of a paragraph or section.	X		
Locating information within a text			
o Locate pages, titles, paragraphs, figures, charts needed to answer questions or solve problems.	X		
o Skim or scan to determine whether or not text contains relevant information.	X	X	
o Cross-reference within and across source materials to select information to perform a routine.	X	X	
o Use a completed form to locate information to complete a task.	X	X	

Applied Basic Skills Analysis
Zircoa - Slipcaster/Slip Specialist

Critical Tasks

Reading Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
Comparing and contrasting			
o Combine information from multiple sources that contribute to the completion of a task.	X	X	
o Select part of text or visual materials to complete a task.	X	X	
o Identify similarities and differences in objects.	X	X	
o Determine the presence of a defect or extent of damage.	X	X	
o Classify or match objects by color, size, or significant marking.	X	X	
o Distinguish between relevant and irrelevant information in text or visuals.	X	X	
Recognizing cause and effect; predicting outcomes.			
o Use common knowledge for safety.	X		X
o Apply preventative measures prior to a task to minimize problems.	X		X
o Select appropriate course of action in emergency.	X		X
Using charts, diagrams, schematics			
o Read two or more column charts to obtain information.	X	X	

Applied Basic Skills Analysis
Zircoa - Slipcaster/Slip Specialist

Critical Tasks

Reading Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
o Apply information from tables or graphs to locate malfunctions or select actions.	X	X	
o Use flow charts and organizational charts to sequence events, arrive at a decision, or problem solve.	X	X	
o Identify details, labels, numbers, parts of an illustration, parts from a key or legend.	X	X	
Inferential comprehension.			
o Determine meaning of figurative, idiomatic, or technical usage of terms, using context clues as reference.	X	X	
o Make inferences from text.			
o Organize information from multiple sources into a series.	X	X	
o Interpret codes and symbols.	X	X	

Applied Basic Skills Analysis
Zircoa - Slipcaster/Slip Specialist

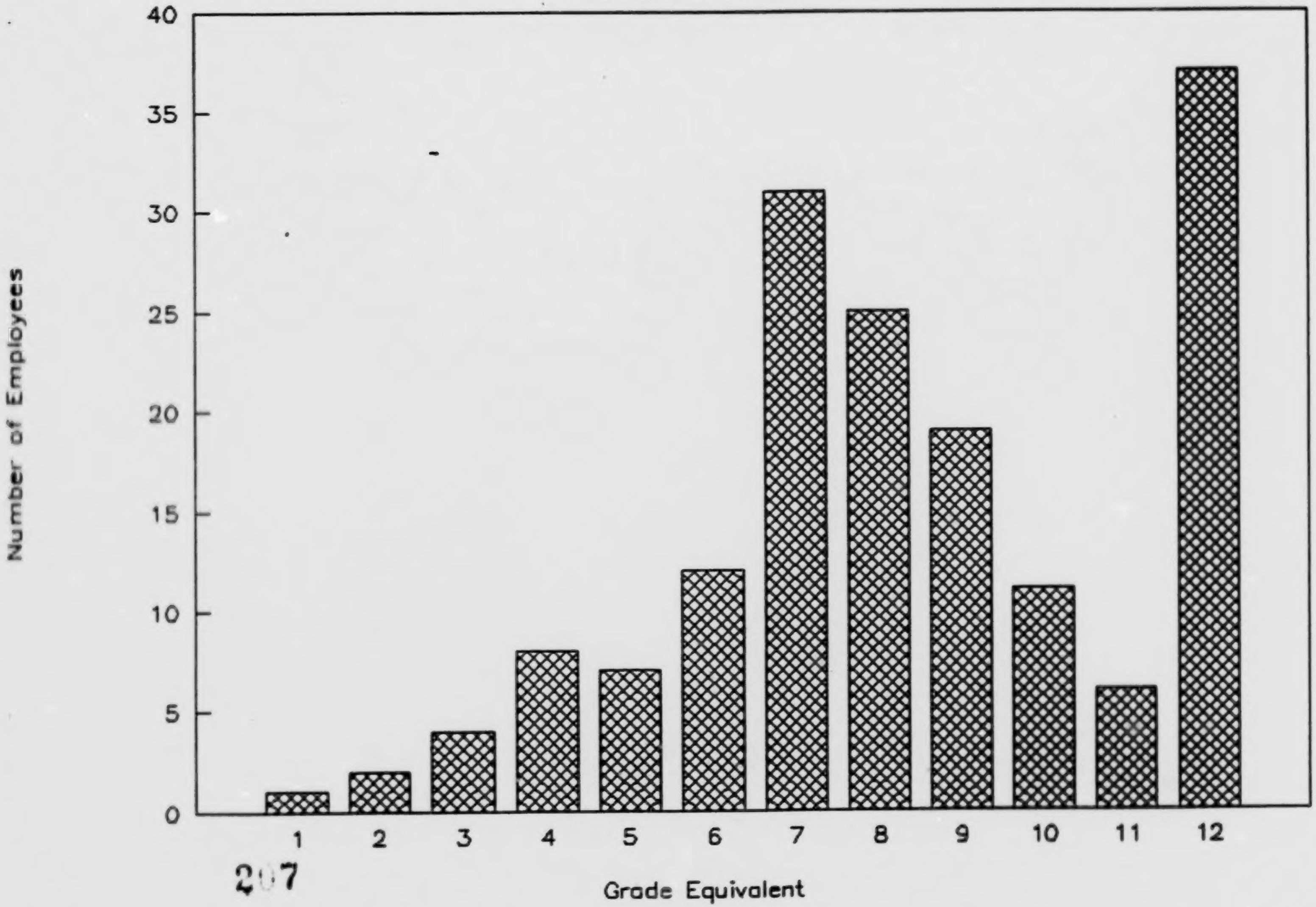
Critical Tasks

Communication Skills:	Read & Understand Process Documents	Chart Data	Preparing For & Using Automation
o Understand and write process documents	X		
o Fill out forms with data and comments		X	
o Communicate verbally with other team and department members	X	X	
o Use basic keyboarding skills			

ATTACHMENT B

TRW TABE RESULTS

Mathematics Profile



ATTACHMENT C

Name of Participant ______________________ S.S. # ______________________

Date of Entry Into Program ______________________ Projected Ending Date: __________ Company: __________

INDIVIDUAL LEARNING PLAN

GROUP INSTRUCTION

*C	PROGRAM GOAL(S)	*S	PROGRAM OBJECTIVES	MATERIALS AND/OR RESOURCES	DATES Start	DATES End	HOURS *P	HOURS *A	REVIEW DATES/COMMENTS
___	☐ Communications-On-The-Job I	___	• Attend Class Regularly	• Syllabus					
___	☐ Communications-On-The-Job II	___	• Complete All Assignments	• Customized Modules					
___	☐ Mathematics-On-The-Job I	___	• Meet Program Instructional Objectives (see syllabus)	• Course Materials					
___	☐ Mathematics-On-The-Job II	___	• Participate Enthusiastically in Class	• Course Assessments/Quizzes					
			• Ask Questions When Necessary						
			___ ___ ___ ___						

INDIVIDUALIZED INSTRUCTION

*C	PROGRAM GOAL(S)	*S	PROGRAM OBJECTIVES	MATERIALS AND/OR RESOURCES	DATES Start	DATES End	HOURS *P	HOURS *A	REVIEW DATES/COMMENTS
___	☐ Reading I	___	• Attend Regularly As Agreed Hrs/Wk = ___	*Reading I* ☐ Reading Horizons					
___	☐ Reading II	___	• Meet Program Instructional Objectives (See attached Learning Plan)	*Reading II* ☐ Que Reading ☐ Another Page ☐ Challenger Work					
___	☐ Mathematics I	___	• Self-Monitor & Self Track Process	*Mathematics I* ☐ Ferranti Interactive Math ☐ Skills Bank					
___	☐ Mathematics II	___	• Ensure Careful Use of Equipment & Resources	*Mathematics II* ☐ Ferranti Interactive Math ☐ Skills Bank					
___	☐ Introduction To Keyboarding	___	___ ___ ___ ___						

______________________ *Signature of Instructor Completing this Form*

______________________ *Signature of Participant*

***KEY** C= Code 1 = Based upon Assessment 2 = Personal Goal S = Section P = Planned A = Actual

Continuing Education Program Participant Interview Form
Individualized Learning Plan

PLEASE PRINT THE INFORMATION REQUESTED BELOW

Date ____/____/____

Name ______________________________ Work Phone ______________________________

Last First

S.S. # ______________________________ Company ______________________________

Home Address ______________________________ Work Hours/Shift ______________________________

City ____________________ Zip __________ Job Title ______________________________

Home Phone ______________________________ Department Name ______________________________

Supervisor's Name ______________________________

- -

HIGHEST GRADE COMPLETED

☐ 0-9 ☐ 10-12 ☐ H.S. Diploma ☐ GED ☐ Some College

☐ Tech Program ☐ College Degree

Latest Educational Experience ______________________________

What do you hope to achieve by participating in this program?

____

LEARNING STYLES, PLEASE RANK BASED ON STUDENT DISCUSSION:

K ______________________________

A ______________________________

V ______________________________

T ______________________________

	Low				High
COMPUTER COMFORT LEVEL	1	2	3	4	5

OTHER INFORMATION

____

____

____

ATTACHMENT D

COURSE TITLE: Communications-on-the-Job I

COURSE DESCRIPTION:

This course incorporates job-related documents, forms, charts, and vocabulary into the communications process. It begins with learning style definition, study skills techniques, and dictionary usage. It develops a job-related vocabulary and provides a thorough discussion of the reading process including recalling factual information, identifying main ideas, following instructions, and drawing logical conclusions.

TARGET AUDIENCE:

This course is designed for employees who need to improve their on-the-job communications skills.

PREREQUISITE:

Third grade reading level

MAJOR TOPICS:

- Personal Learning Style
- Study Skills Techniques
- Active Listening
- Dictionary Usage
- Technical Dictionary Usage
- Job-Related Vocabulary
- Phonics
- The Reading Process
- Recalling Factual Information
- Following Instructions
- Drawing Logical Conclusions

COURSE LENGTH: 20 Hours

SUGGESTED COST: $2000/Group (max. group size of ten)

COURSE TYPE: 4

COURSE TITLE: Communications-on-the-Job II

COURSE DESCRIPTION:

This course incorporates job-related documents, forms, charts, and vocabulary into the communications process. It begins with learning style definition, study skills techniques, and dictionary usage. It develops a job-related vocabulary and provides a thorough discussion of the reading process. Commonly used prefixes and suffixes, homophones and homographs, and codes/symbols used in reading job-related schematics and blueprints are covered. In-depth analysis of technical manuals and job-related documentation.

TARGET AUDIENCE:

This course is designed for employees who need to improve their on-the-job communications skills.

PREREQUISITE:

Fifth grade reading level

MAJOR TOPICS:

- Personal Learning Style
- Study Skills Techniques
- Active Listening
- Dictionary Usage
- Technical Dictionary Usage
- Job-Related Vocabulary
- The Reading Process
- Homophones/Homographs
- Common Prefixes and Suffixes
- Synonyms/Antonyms
- Codes/Symbols in Schematics/Blueprints
- Reading Technical Manuals
- Reading for Meaning
- Job-Related Memos and Documentation

COURSE LENGTH: 20 Hours

SUGGESTED COST: $2000/Group (max. group size of ten)

COURSE TYPE: 4

COURSE TITLE: Mathematics-on-the-Job I

COURSE DESCRIPTION:

This course incorporates job-related calculations, processes, and measurement along with basic computation enhancement. It begins with a discussion of math anxiety and presents techniques for overcoming math anxiety. Basic concepts include addition, subtraction, multiplication, and division of whole numbers, with an emphasis on solving job-related problems using these operations. It includes an introduction to fractions, a comprehensive discussion of decimals, and job-related problem solving.

TARGET AUDIENCE:

This course is designed for employees who need to improve their on-the-job mathematical and computation skills.

PREREQUISITE:

Third grade reading level

MAJOR TOPICS:

- Whole Numbers
- Fractions
- Decimals
- Conversion of Fractions to Decimals
- Percents
- Job-Related Problem Solving
- Ratio and Proportion

COURSE LENGTH: 20 Hours

SUGGESTED COST: $2000/Group (max. group size of ten)

COURSE TYPE: 4

COURSE TITLE: Mathematics-on-the-Job II

COURSE DESCRIPTION:

This course incorporates job-related calculations, processes, and measurement along with basic computation enhancement. It begins with a discussion of math anxiety and presents techniques for overcoming math anxiety. Basic concepts include review of addition, subtraction, multiplication, and division of whole numbers, with an emphasis on solving job-related problems using these operations. Additional topics include fractions, metric calculations and conversions, integers, linear equations, pre-Algebra concepts, solving work-related equations, and applying work-related formulas.

TARGET AUDIENCE:

This course is designed for employees who need to improve their on-the-job mathematical and computation skills.

PREREQUISITE:

Fifth grade reading level

MAJOR TOPICS:

- Review of Whole Numbers
- Review of Fractions
- Review of Decimals
- Conversion of Fractions to Decimals
- Percents
- Metric Calculations and Conversions
- Job-Related Problem Solving
- Integers
- Linear Equations
- Formulas
- Applying/Solving Job-Related Equations

COURSE LENGTH: 20 Hours

SUGGESTED COST: $2000/Group (max. group size of ten)

COURSE TYPE: 4

ATTACHMENT E

MATHEMATICS ON THE JOB I
PRE-ASSESSMENT

I. Write the following as whole numbers:

A. Four hundred thousand nine hundred eighty-six

____

B. Seven million eight hundred twenty-one thousand one hundred thirty-three

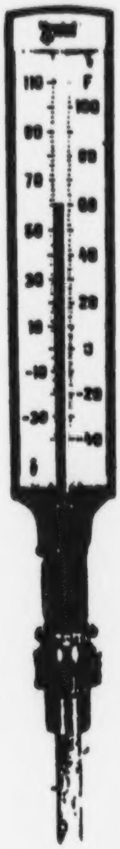
____

II.

A. The mercury on this thermometer reads at the _____° F level.

B. The dial on this indicator points to the number _____

This is read as _____



110
F
100
90
80
70
60
50
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30
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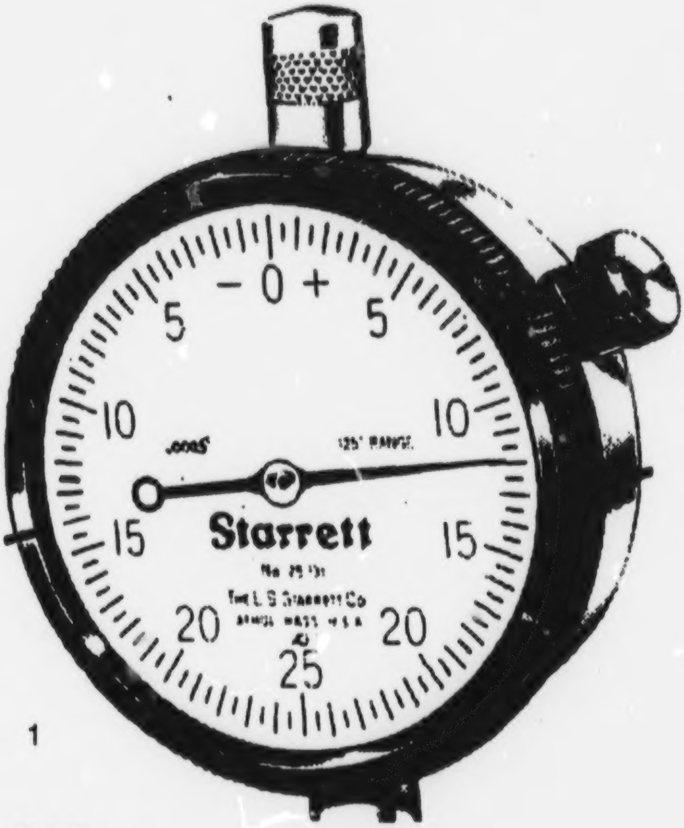
0
-10
-20
-30
-40



− 0 +
5
5
10
10
.0005"
.125" RANGE
15
15
Starrett
No 25-131
The L.S. Starrett Co
ATHOL MASS. U.S.A.
20
20
25

III. Add the following numbers:

A. 415
+ 932

B. 18,441
59,609
+ 23,484

IV. Subtract the following numbers:

A. 495
- 23

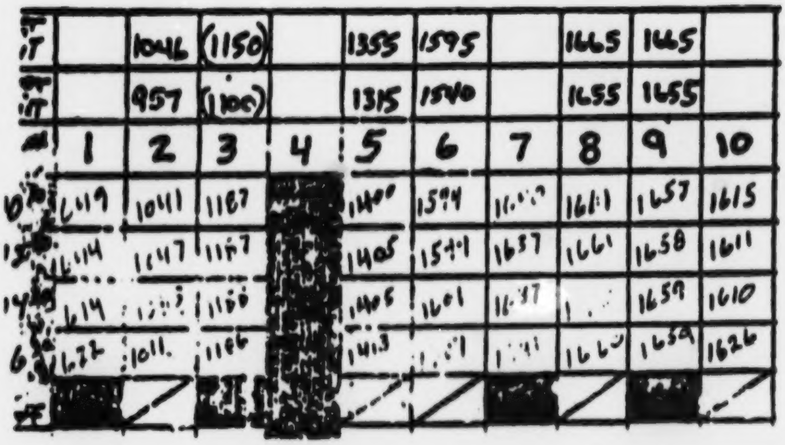
B. 88
- 74

V. Solve the following problems:

A. What is the total weight - calculated, to be added?

BATCH NO./ DRUM NO.	LBS. TO BE ADDED	ACT. WT. ADDED
✓ 4476-1	296	
✓ 4476-2	341	
✓ 4515-2	365	
✓ 4515-3	355	
TOTAL WT. CALCULATED		
TOTAL WT. ACTUAL		

B. Add the temperature readings for Group 5.



[illegible]		1046	(1150)		1355	1595		1665	1665	
[illegible]		957	(1100)		1315	1540		1655	1655	
[illegible]	1	2	3	4	5	6	7	8	9	10
6	1619	1041	1167	[illegible]	1400	1594	[illegible]	1661	1657	1615
15	1614	1047	1167	[illegible]	1405	1591	1637	1661	1658	1611
14	1614	[illegible]	1160	[illegible]	1405	1601	1637	[illegible]	1659	1610
6	1622	1011.	1166	[illegible]	1413	[illegible]	[illegible]	1662	1659	1626
[illegible]										

VI. Multiply the following numbers:

A.
$$\begin{array}{r} 812 \\ \times\ 716 \\ \hline \end{array}$$

B.
$$\begin{array}{r} 8{,}421 \\ \times\ 18 \\ \hline \end{array}$$

VII. Divide the following:

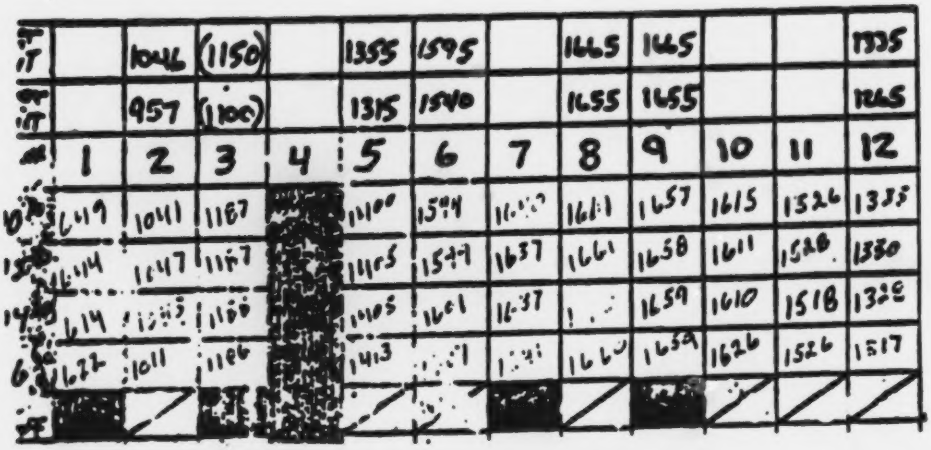
A. 184 ÷ 23 =

B. $64\,\overline{)\,9245}$

VIII. Solve the following problems:

A. Last week, 25 drums of A-grain each weighing 55 pounds were produced. How many pounds total of A-grain were produced?

B. Find the average for the temperature readings in Group 11.



[illegible]		1046	(1150)		1355	1595		1665	1665			1335
[illegible]		957	(1100)		1315	1540		1655	1655			1265
[illegible]	1	2	3	4	5	6	7	8	9	10	11	12
10	1619	1041	1187		1100	1594	[illegible]	1661	1657	1615	1526	1335
15	1614	1047	1187		1105	1547	1637	1661	1658	1611	1528	1330
14	1614	[illegible]	1100		1105	1601	1637	[illegible]	1659	1610	1518	1328
6	1622	1011	1186		1413	[illegible]	[illegible]	1660	1659	1626	1526	1517
[illegible]												

VIII. Solve the following problems:

A. Last week, 25 drums of A-grain each weighing 55 pounds were produced. How many pounds total of A-grain were produced?

B. Find the average for the temperature readings in Group 11.

IX. Convert the following:

A. Write .632 as a percent. ________________

B. What is the decimal equivalent of 1/4?________________

X. Solve the following problem:

A. GRIND 1.000" DIA. STOCK TO 1-3/8" LGTH
(REF)

What would the stock length be expressed as a decimal? ________"

XI. Add the following decimal numbers:

A. .836 + 1.59 + 42.64 =

B. 49.23 + .80 + 7.41 =

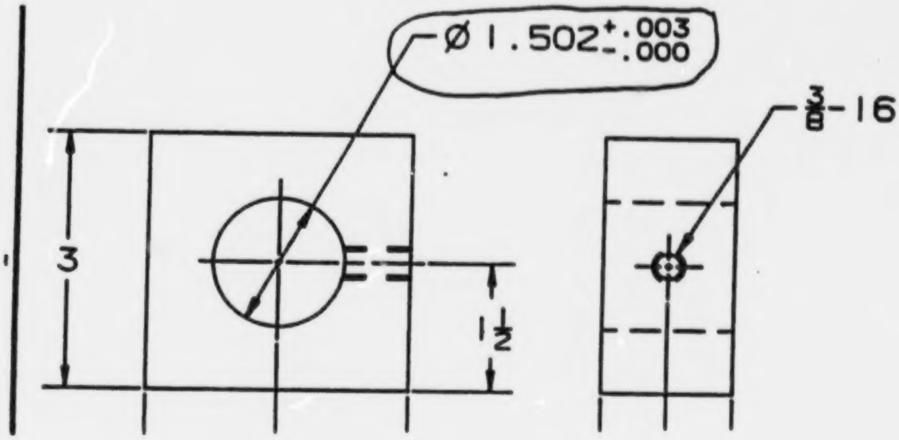
XII. Subtract the following decimal numbers:

A. 18.449 - .671 =

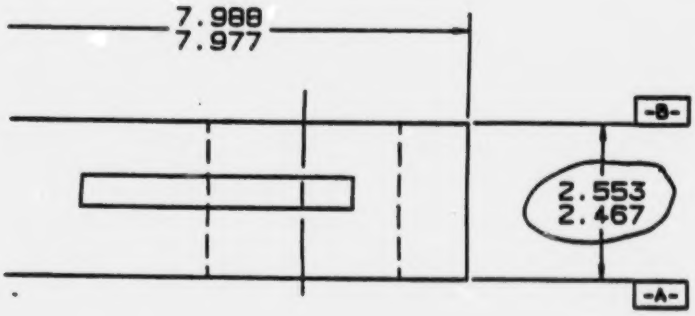
B. 8.224 - .55 =

XIII. Solve the following problems:

A. Find the upper (+) tolerance of the circled dimension. _____


Ø 1.502 +.003 -.000
3/8-16
3
1 1/2

B. What is the difference between the circled dimensions. _____


7.988
7.977
-B-
2.553
2.467
-A-

XIV. Multiply the following decimal numbers:

A. 8.83 x 92.4 =

B. .855 x 1.5 =

XV. Divide the following decimal numbers. Carry your answers out to 3 decimal places.

A. $82.4 + .58 =$

B. $77.51 + 8.9 =$

XVI. Solve the following problems:

A. You worked 187.75 hours in 2.5 weeks. How many hours did you average per week? Carry your answer out to 2 decimal places. ________

B. You can earn 2.25 vacation days each month. How many days of vacation would you have at the end of 6.5 months. Carry your answer out 3 decimal places. ________

XVII. Solve the following word problem.

A. You're mixing a batch with the following composition:

Zircoa A.H.	68.8 %
$CaCO_3$	30.7 %
MgO	.5 %

The batch is to weigh 1500 grams. How many grams of $CaCO_3$ do you need to add?

XVIII. Determine the following ratios for the problem given:

For a fine grain batch, the pounds in is 1423 pounds. The press mix out is 1205 pounds.

A. What is the ratio of pounds in to press mix out?

____

B. Express the ratio found in A as a percent.

____

XIX. Solve the following problems:

A. Determine the unknown number in the proportion:

6:8 = ____:24

B. You are to mix up a solution which is 10 parts chemical concentrate and 25 parts de-ionized water. If you start with 5 liters of de-ionized water, how many liters of chemical concentrate will you need to add?

XX. Add or subtract the following fractions. Reduce your answers to lowest terms.

A. 9/32 + 15/32 =

B. 6/5 + 13/16 =

C. 5/8 - 2/8 =

D. 4 5/8 - 1 7/8 =

XXI. Convert the mixed number below to an improper fraction.

A. 11 2/3 =

XXII. Convert the improper fraction below to a mixed number.

A. 89/11 =

XXIII. Multiply or divide the following fractions. Reduce the answer to lowest terms. If the answer is an improper fraction, convert it to a mixed number.

A. 3/5 x 3/4 =

B. 7 1/4 x 9/16 =

C. 3/5 ÷ 9/20 =

E. 6 3/4 ÷ 1 1/2 =

XXIV. Solve the following problem:

A chemical concentrate flows into Tank A at the rate of 1 3/4 liters per minute. How many liters of chemical concentrate will be in Tank A at the end of 5 1/2 minutes?

ATTACHMENT F

PARTICIPANT EVALUATION SUMMARY
FIRST ROUND ZIRCOA GRANT DELIVERY

November 9 - December 17, 1992

PARTICIPANT EVALUATION SUMMARY
FIRST ROUND ZIRCOA GRANT DELIVERY - November 9 - December 17, 1992

Overall averages for Evaluation Form responses from 9 first round classes.

COURSE EXPECTATIONS:

87% agreed the course content met their expectations.
83% agreed that they had the necessary skills and knowledge necessary to take courses.
73% agreed that the amount of time allotted for courses was adequate.

COURSE CONTENT:

82% agreed that courses would help them do their jobs more effectively.
82% agreed that courses had practical application to their jobs.
100% rated their overall impression of courses as high.
88 % agreed that course objectives were clearly stated.
88% agreed that stated course objectives were met.

METHODS OF INSTRUCTION:

92% agreed there were sufficient exercises/practice with new skills and concepts.
81% rated instructional materials (textbook/workbook, syllabus/outline, and audio-visual aids) most helpful.
89% rated instructional methods/aids (text, lecture, exercises, discussions, Q&A, and videotapes) most helpful.
78% rated computer-based training helpful.
72% agreed that materials were well organized.

INSTRUCTORS:

88% rated instructors excellent on organization and preparation, master of subject matter, ability to make participants feel welcomed and at ease, willingness to answer questions, and the ability to communicate subject matter tot he participants.

95% indicated they would take another course with their instructor.

FACILITIES:

82% rated the quality of the training rooms as very good or excellent.
93% agreed that the necessary supplies were available to them.

COMPLETE PARTICIPANT WRITTEN COMMENTS:

Most useful information presented:

"Every facet of this course can be classified as most useful."
"Review of things I learned 25 years ago."
"How to listen."
"The effect of one's comment, actions, etc., on other people."
"Handling difficult people and the Going Nowhere Cycle."
"Overall help in batching."
"Example problem[s] along with charts."
"Being a machinist, my world revolves around numbers and various applications (i.e. math, Trig, Geometry etc etc) of them. So every facet of this course can be classified as 'most useful[.]'
"Metrics[.] Add[ing] and subtrac[t]ing fractions."
"Fractions & metrics"
"Temp. changing"
"Not enough time, classroom for material [sic]"
"The word that we had to give the meaning to that were job related [sic]."
"The phonics was most useful."
"Learning to [sic]"
"all useful"
"in general, all was helpful to recall information long ago learned."
"It help[ed] me understand much better[;] also it help[ed] me to help my kids in algebra."
"Fractions."
"Will help in batching."
"Everything."
"Algebra and the metric system help[ed] me out a lot.
"Fractions."
"Good instrust [sic] & Instructor."
"Way of communicating - vocal & body language."
"How to become a more empathetic listener."
"How to listen." (another participant)
"How to listen." (another participant)
"Probably understanding ourselves."
"Understanding different behavior pat[t]erns and why they happen."
"The different levels of listening."
"To review math skills that I haven't reviewed or remembered for 20 years."
"It made me more aware of being an empathetical [sic] listener. It gave me some ideal [sic] on how listening can work for me."
"Handling difficult people and the "Going Nowhere Cycle."
"The different behavior modes we tend to be oblivious toward."
"Listening skills & how to work with others and deep communication open."
"Text books and video tapes."
"I didn't know listening is a skill. Now I realize that."
"Skills."
"Interest in learning new words such as homophone, proprietary."
"Fractions and decimals."
"All information will be very useful for me."
"Fractions and decimals." (another participant)
"Spend less time on adding & subtracting."
"fraction[s] and decimals."(another participant)

Least useful information presented:

"N/A"
"Positive and negative numbers"
"Metric."
"Names of the behaviors."
"How to speak."
"Hopefully metrics."
"Needed more class time."
"Fractions are always done on calculator."
"I think all the information was necessary."
"Need more time."
"Roleplaying."
"None."
"None."
"Does not apply"
"Algerba [sic]"
"Not enough time to really learn material[.] everything seem[ed] rushed[.]"
"None."
"None."
"ever[y] time I go to use the computer the Hold Plant [sic] would walk by, and I can't get the thim [sic] to work [.] No one was aroung[sic] to Help so I just say for get [sic] this mess--"
"hopefully metrics"
"Metric system is helpful but it does not applied [sic] to our job."
"Fractions are always done on calculator."
"Needed more class time."
"None."
"More time."
"Character roles."
"How to speak."
"The names of the behaviors."
"I think all the information was necessary."
"None."
"Need more time."
"No least useful."
"Roleplaying."
"None."
"Time to[o] short."
"Time to[o]short." (another participant)
"The circles."
"None."
"The circles." (another participant)
"The first two session[s]."
"Addition and subtraction."

Comments about the materials:

"The videotapes were really bad."

"I thought the instructor was well-prepared and answered in [a] proper and well-expressed manner."

"Went to[o] fast. Really didn't get a whole lot out of this course."

"Excluding the few mistakes found in the textbook, I feel this course was excellently organized and delivered to the students."

"There were typing errors, spelling & wrong answers."

"It was a fast pace."

"There were a lot of mistakes"

"Not long enough for material cover [sic]."

"Verry [sic] Good."

"Hard to remember."

"Computer-based Training need instructure [sic]."

"None."

"None."

"Better organization of exercises...different levels of participation made the 'role playing' an ineffective tool. Could try one set of role players - a little more time to prepare and let balance of class observe/comment."

Comments about instructors:

"Super."

"Highly competent instructor and very good natured."

"Very helpful and easy to understand."

"I liked small classes so we all can get individual attention."

"Course was well presented but it was to[o] fast for complete understanding."

"I felt you did a good job, but you went just a little too fast."

"Nancy was [a] good instructor."

"A job very well done[;] beautiful."

"Oh yea!"

"I feel Lisa was a very good instructor and very helpful."

"Course was well presented,but it was to[o] fast for complete understanding."

"Very good ability to teach."

"Feeling of friendship was there. Easy going attitudes."

"Good luck."

"None."

"Marianne Canario was a wonderful* instructor. 5 and plus. She was excellent."

"A very good instructor."

"Marianne was a terrific instructor. Fears from years ago were almost erased & the IS something."

Comments about the facility:

"Excellent job, Zircoa."
"Did not get to the computer lab."
"Class too large for room."
"Tables too close."
"Room too small."
"Did not get to go."
"Not enough room/Class was too large."
"exexe [sic]"
"Unfortunately, I had no time to use the lab."
"Would like to take this course at a slower pace."
"Satisfactory."
"Thanks."
"Tables to[o] close."
"Have fun."
"None."
"None."
"The room was to[o] small."

Additional comments about classes:

"If the course was 2-4 hours longer over the entirety, would have helped."
"Thanks."
"Overall good class and instructor."
"Enjoyed the class, wish everyone at Zircoa would take this class."
"Enjoyed it much. Hated to miss some class[es]."
"Good course, I needed the revue [sic]."
"Enjoyed it very much. Hated I had to miss some class."
"Enjoyed the class, wish everyone at Zircoa would take this class."
"Overall good class and instructor."
"Good looking out! More, more, more."
"I enjoyed the class had a very good instructor [sic]."
"We had a great instructor."
"Our instructor was extremely patient and we learned very well with her."

PARTICIPANT EVALUATION SUMMARY
SECOND ROUND ZIRCOA GRANT DELIVERY

January 18 - February 23, 1993

PARTICIPANT EVALUATION SUMMARY
SECOND ROUND ZIRCOA GRANT DELIVERY - January 18 - February 23, 1993

Overall averages for Evaluation Form responses from second round classes.

COURSE EXPECTATIONS:

75% agreed the course content met their expectations.
79% agreed that they had the necessary skills and knowledge necessary to take courses.
65% agreed that the amount of time allotted for the courses was adequate.

COURSE CONTENT:

73% agreed that courses would help them do their jobs more effectively.
70% agreed that courses had practical application to their jobs.
88% rated their overall impression of courses as high.
83% agreed that course objectives were met.

METHODS OF INSTRUCTION:

83% agreed there were sufficient exercises/practice with new skills and concepts.
85% rated instructional materials (textbook/workbook, syllabus/outline, and audio-visual aids) most helpful.
91% rated instructional methods/aids (text, lecture, exercises, discussions, Q&A, and videotapes) most helpful.
86% rated computer-based training helpful.
84% agreed that materials were well organized.

INSTRUCTORS:

97% rated instructors excellent on organization and preparation, master of subject matter, ability to make participants feel welcomed and at ease, willingness to answer questions, and the ability to communicate subject matter to the participants.

95% indicated they would take another course with their instructor.

FACILITIES:

64% rated the quality of the training rooms as very good or excellent.
90% agreed that the necessary supplies were available to them.

COMPLETE PARTICIPANT WRITTEN COMMENTS:

Most useful information presented:

"Understand your own learning style"
"Listening and comprehension
"All were useful"
"All was useful"
"Reviewing & "Learning" Learning Skills"
"How to handle a problem situation effectively"
"Good listening leads to good communication"
"What type of verbal and non-verbal messages are you sending"
"I think the book "Listen In" is very informative"
"Definition of the 3 levels of listening"
"Seeing myself in a situation & now having the knowledge on how to talk my way through it"
"The whole course"
"Types of listening - how to be effective listener - barriers to listening"
"How to go about remembering"
"Blue Print Reading"
"The ways to read subject matter"
"Reading speed because one has to know his study and normal speed, as well as when to skim and when to scan"
"Everything"
"Use of a dictionary"
"That it is not necessary to read each word when doing reading"
"Reading/Notetaking"
"Notes on how to read better"
"How to read more effectively, follow instructions and listening to what you hear."
"This course emphasized and clarified importance of learning and listening skills"
"Understanding listening skills and other basic communicating skills"
"Reading ability"
"Reading ability improved - but I still need more practice"
"The vocabulary part"
"How to communicate properly"
"Math"
"Use of fractions and formulas"
"Algebra review"
"The listening gap & the roles people play. (Driver, Analytical, Amiable, & Expressive)."
"I'm OK, your OK"
"Be compassionate yet amiable"
"Levels of Listening & Attitude Modes"
"An scientific way to approach communicating with others and a simplified method to check why sometimes we communicate with others and a simplified method to check why sometimes we communicate effectively and other times not"
"The three levels of communication"
"Recognizing bad listening & realizing how you can improve. How to deal with difficult people. Role playing was effective & fun"
"Understand of listening - being empathetic and resolving conflicts. I am not a particularly good listener."
"All"
"Blackboard exercise"
"Verbal vs listening capability - the gap"
"How to identify the type of person/listener your dealing with. What type of personality I am."
"Empathetic listening - considering other's feelings when you present your thoughts."
"Non verbal communication - transactional analysis"
"Showed us how we could be listening or not just by our body language & facial expressions."
"How to get along with all kinds of people and you can"
"The lost art of listening"
"How when you listen or talk to someone its a 50, 50. The speaker is responsible for 50% of communication and the listener is responsible for 50% of communication."
"Three levels of listening, I'm ok - Your Ok positions, Drama triangle - Techniques for achieving empathic listening - Personal styles and how to use them"

Least useful information presented:

"Blueprints"

"None"
"Movie. Very boring"
"Video on Blueprints"
"Roleplay was too repetitious"
"None"
"Role playing"
"Length of total time"
"The role playing is a waste of time because no significant amount of time is spent critiquing"
"None come to mind at this moment"
"Everything was useful"
"The intro - role playing for me - as I do this daily"
"None"
"All useful"
"No comment"
"None"
"For work purposes - general word meanings"
"N/A"
"Phonics"
"Dictionary Skills"
"Too many dictionary having their own vocabulary"
"Action & passive reading"
"Not long enough"
"Not any"
"Telling people that they must always use empathic listening - I still don't agree"
"N/A"
"Empathetic listening. Not because it may not be useful but it just sounds so phony"
"None"
"Excessive role playing"
"N/A"
"Math"
"Time allowed not enough"
"Should have real live examples from work"
"Bias of communication and body structure"
"N/A"

Comments about the materials:
"The materials seemed to be bits and pieces from various sources that didn't seem to flow together very well."
"Something you use every day is great"
"The videotapes were very effective, but all the worksheets that we had to fill out after watching the videos were quite tedious."
"I got more from the book than from the practice and discussion"
"Very Well!"
"Very Good!"
"I feel they were proper for this class"
"More job related. Next time"
"Like to have more time"
"This is a well prepared course"
"I think the instructor used good methods for the course."
"I enjoyed the class, but I feel there should have been more discussion with the class instead of the role playing."
"Lisa was a very good instructor. She kept the class moving. Wasn't boring at all"
"Very good"

Comments about instructor:
"In my opinion the instructor is better suited to teaching more structured academic subject such as math. I would prefer to have her as an instructor in that type of subject."
"Attention getter she is great teacher - interesting"
"Best aspect was the ability to elicit class participation - group discussion. She related personal experiences which made the class "Real".
"Had an excellent instructor. Mrs. E."
"Best UTC instructor at Zircoa. Very personable & presented extra insight that made the course worth while. Good Job. Karen."
"Instructor gave impression material was good & worthwhile. I've heard other classes comment that their instructor thought some exercises were stupid but did them because had to."
"I think the instructor makes a big difference"

"Very good, was a pleasure to go to her class"

"Our instructor was very effective. I think that she could tell that not everyone wanted to be in class, but her warmth & enthusiasm made the time bearable"

"The instructor should try not to say "you know" as often."

"Instructor was a very good teacher. Also taken the time to help you get a better understanding in helping when in need"

"Instructor was a very good teacher. Took the time to help you get a better understanding when in need."

"The instructor was really knows the material & know what was to be done correctly."

"She was OK. I really like Nancy my math teacher. She was really thorough. More expressive."

"Lisa was great. Love to have her back."

"Sometime the instructor let the students take too long covering certain subject."

"The instructor let to many people ramble on and on."

"I appreciate the interest given"

"She was well prepared, very nice attitude always with a smile."

"Very Good Job" Thank you - Lisa Notzen"

"Felt comfortable with instructor"

"The course was too short, need more time to cover more things."

"I believe the instructor did a fine job. My only complaint being the course being too long."

"Lisa did an excellent job in teaching this course. It was very enjoyable."

"Lisa was a great instructor, she made the class interesting and exciting."

"She kept a good pace with the class. She was very helpful."

"Job well done"

"I like the way out instructor took time to review past information."

"Kept the class alive. Seemed to enjoy what she was teaching."

Comments about the facility:

"This course was very helpful. But I cannot afford to cut 4 hrs of my workload out I need. If the course could be condensed to 1-2 hr/wk would be acceptable."

"VCR should be mounted high on wall."

"Better timing - After hours??"

"I enjoyed the class and most of all learned."

"We need more time for class to audio room.""Very good instructor - not boring."

"Very helpful"

"Room too small"

"I liked being in this class, but I'm a very poor English student."

"I like the review I had last time in math class teacher went over everything of importance before test. We really didn't have a thorough review only open for questions."

"To make many people in class. Need better lighting".

"The room was cold"

"The facility was ok, had necessary supplies."

"We should have been given a dictionary, as part of the course supplies."

"Need more supplies/books, worksheets"

"My problem, I needed more time."

"Suggest this course & teacher for all employees at Zircoa."

"Enjoyed class & instructor"

"I enjoyed the course & think it will help me in my job & private life. Thank You"

"It was a little warm at times but everyone agreed on temp. thermostat adjustment."

"Room was either too hot (stuffy)_ or cool"

"Was very cold most of the time"

"Very helpful with good atmosphere"

"Room from very warm to cool"

Additional comments about classes:

"Teacher did a job well done "A-OK"

"I believe that the allocated time could be cut in half."

"It was more than adequate - there was too little material spread over too long a time."

"None"

"The course was much help to me."

"Long course time would have been great."

"Need more time did finish sections 9 & 10."

"I feel course could drastically be shortened."

"2 hours/week was too much time to give up from my week. I enjoyed the course but couldn't spend that much time, can it be condensed to 1-2 hr/week?"

PARTICIPANT EVALUATION SUMMARY CLEVELAND WOOD PRODUCTS GRANT DELIVERY

April 19 - June 30, 1993

PARTICIPANT EVALUATION SUMMARY
CLEVELAND WOOD PRODUCTS GRANT DELIVERY - April 19 - June 30, 1993

Overall averages for Evaluation Form responses from grant classes.

COURSE EXPECTATIONS:

93% agreed the course content met their expectations.
93% agreed that they had the necessary skills and knowledge necessary to take courses.
75% agreed that the amount of time allotted for the courses was adequate.

COURSE CONTENT:

79% agreed that courses would help them do their jobs more effectively.
77% agreed that courses had practical application to their jobs.
90% rated their overall impression of courses as high.
94% agreed that course objectives were met.

METHODS OF INSTRUCTION:

97% agreed there were sufficient exercises/practice with new skills and concepts.
98% rated instructional materials (textbook/workbook, syllabus/outline, and audio-visual aids) most helpful.
88% rated instructional methods/aids (text, lecture, exercises, discussions, Q&A, and videotapes) most helpful.
80% rated computer-based training helpful.
94% agreed that materials were well organized.

INSTRUCTORS:

92% rated instructors excellent on organization and preparation, master of subject matter, ability to make participants feel welcomed and at ease, willingness to answer questions, and the ability to communicate subject matter to the participants.

100% indicated they would take another course with their instructor.

FACILITIES:

81% rated the quality of the training rooms as very good or excellent.
97% agreed that the necessary supplies were available to them.

SELECTED PARTICIPANT WRITTEN COMMENTS:

Most useful information presented:

"Words I wasn't sure about."
"All is useful."
"...did a good job. But I don't see what any of this has to do with our job."
"Fractions."
"Learning decimals."
"Everything! Fantastic!"
"The word problems relating to my job."
"Gauge readings."
"Only skids + ctn + daily production and man hours."
"How to communicate by listening and speaking."
"Trying to rephrase your comments using an I-message approach."
"I learned there is more than one way to learn something.
"None."

Least useful information presented:

"Simple addition."
"Reducing fractions."
"Story problems."
"Ratios."
"The computer because of time."
"Not enough time to practice information presented."
"All."
"At times it was just too easy."

Comments about the materials:

"Too many errors on worksheets, graphs. Dials misleading/not very clear."
"Who every [sic] wrote Nancy's book did not proofread it-- a lot of mistakes in her book."
"Was not job-related enough."
"Needed more time on sections."

Comments about instructor:

"I give her a 10+!"
"A very nice person and a very good teacher."
"Excellent instructor. A pleasure to meet and work with."
"Liked the instructor."
"She made the class enjoyable."

Comments about the facility:

"Room too hot!"
"Room small for both lab and classroom."
"Not enough room to work at computers comfortably and too noisy."
"Not enough computer time."
"Need separate room for computer lab time."

Additional comments about classes:

"I learned a lot considering the time we had."
"I feel much better about decimals, such as division."
"Too much material to remember."
"Overall a very rewarding and educational experience."
"Need more time; trying to cram too much into course."
"Allowing food and drinks would have been nice."
"I enjoyed this class very much. It was fun."
"Course was not really what I expected."

CLEVELAND WOOD PRODUCTS
COMMUNICATIONS ON THE JOB I

April 19, 1993 - May 21, 1993

Instructor: Marianne Canario — **May 23, 1993**
Sections Number: 30400/30401 — **No. of Participants: 14**

Note: These two sections of Communications I were vastly different in make-up: one was a class of individuals who had not had the opportunity for skills enhancement in the past. Although their reading levels were fairly low, their verbal communication skills were adequate for the purposes of the class. The other class was almost exclusively those with limited English proficiency, in some cases due to the fact that their native language was other than English.

I do not feel confident that the Limited English Proficiency (LEP) group really understood how to mark the evaluation form. For example, in some cases two numbers were circled for each question, and in every case participants marked 5 all the way down the page. Therefore, I have only tabulated those responses from the first class. I have, however, included the written comments generated by the second group in this evaluation.

COURSE EXPECTATIONS:

100% agreed that the course content met their expectations.
100% agreed that they had the necessary skills and knowledge to take the course.
100% agreed that the amount of time allotted for the course was adequate.

Comments:

- I've learned a lot considering the time we had.

COURSE CONTENT:

100% agreed that the course will help them do their job more effectively.
100% agreed that the course had practical application to their job.
100% of participants rated this course very good or excellent.
100% agreed that the objectives of the course were clearly stated.
100% agreed that the course met the stated objectives.

Comments on most useful information presented:

- Words I wasn't sure about (2 times)
- Our teacher (2 times)

Comments on least useful information presented:

- Doing the alphabet.

METHODS OF INSTRUCTION:

100% agreed that there were sufficient exercises and practice with new skills/concepts.
100% rated all the instructional materials and classwork helpful.

Comments:

- I enjoyed being in Communications I and having Marianne as a teacher.

INSTRUCTOR:

100% rated the instructor excellent in every category.
100% would definitely take another course with this instructor.

Comments:

- I think Marianne was a great instructor, and I hate that I can't have her for my math teacher.
- I give her a 10 + !!
- Very good at getting her viewpoint over to us.
- Very nice teacher
- I enjoyed the class with Marianne.
- I loved her.
- Lovely class. I like Marianne very much.
- Very nice person, very nice teacher. I would like to have more classes with you.
- A very nice person and very good teacher.
- I like you.

FACILITIES:

83% felt the training room was adequate.
100% felt necessary supplies were available to them.

Comments:

- Room too hot ! (2 times)
- Room small for both lab and classroom.

INSTRUCTOR COMMENTS:

There was considerable resistance in both groups to the idea of taking classes. Consequently, activities were purposely structured to relieve the stress of the situation and to enhance participants' confidence in their own learning abilities. Many concepts were first presented with games or exercises, and then "de-briefed" to ensure that participants could transfer the learning to their situations. This approach was highly effective with these two groups, particularly because their reading levels were quite low; considerable frustration would have ensued from a strict follow-the-book approach.

I feel that there was marked success in both anxiety-relieving and confidence. This was evidenced by the pre- and post-test scores: pre-test scores (for the combined classes) ranged from a low of 29% to a high of 72%. Only five weeks later, however, ***post-test scores ranged from 79% - 96% -- including the members of the Limited English Proficiency class!!*** Average improvement was 35% from pre-test to post-test.

Although progress was slower with the LEP participants, their success was much more noticeable; their pre-test scores were lower and consequently, they showed a greater improvement on the post-test. Pre-test scores ***for this group alone*** ranged from 29% to 53%; by the post-test, scores ranged from ***80% to 96% !!*** The average improvement for this class was ***43%.***

Another evidence of the improvement was in the attitudes shown by the participants. Many were very.reluctant to enter a classroom again. By the end of this five-week session, every participant in both these classes was asking when the next session would be, and what classes would be offered after that session.

I particularly enjoyed working with these two classes. It was a constant challenge to present the material in a way which would not require much reading. However, I was able to build rapport with the participants, to the point that every one of them commented to me that they wanted to take their next class with me also.

CLEVELAND WOOD PRODUCTS

MATHEMATICS-ON-THE-JOB I
April 20, 1993 - May 20, 1993

EVALUATION SUMMARY

Instructor: Nancy Hoffstadt Date: May 24, 1993

COURSE EXPECTATIONS:

96.7% agreed that the course content met their expectations.
86.7% agreed that they had the necessary skills and knowledge necessary to take the course.
76.7% agreed that the amount of time allotted for the course was adequate.

COURSE CONTENT:

63.3% agreed that this course will help them do their job more effectively.
73.3% agreed that this course has practical application to their job.
93.3% rated their overall impression of this course high.
96.7% agreed that the objectives of this course were clearly stated.
93.3% agreed that the course met the stated objectives.

Participant comments on the most useful information presented in this course are as follows:

* "All is useful."
* "Nancy did very good job. But I don't see what any of this has to do with our job."
* "Reading dials, gauges, rulers" (4 responses)
* "Fractions"
* "Learning decimals"
* "Everything! Fantastic!"

Participant comments on the least useful information presented in this course include:

* "Simple addition"
* "Reducing fractions"
* "Story problems"

METHODS OF INSTRUCTION:

96.7% agreed that there were sufficient exercises/practice with new skills and concepts.
86.7% rated instructional materials (text/workbook, syllabus/outline, and computer-based training) helpful.

76.7% rated the text instructional aid helpful.
93.3% rated the lecture, exercises, class discussion/ question and answer helpful.
83.3% agreed that the materials were well organized.

Participants' comments include the following:

* "I do fill (sp) that class should have been a little longer."
* "Too many errors on worksheets, graphs. Dials misleading/not very clear."
* "Who every (sp) wrote Nancy's book did not proofread it--a lot of mistakes in her book."

INSTRUCTOR:

100.0% rated the instructor excellent on organization and preparation, mastery of subject matter, ability to make participants to feel welcomed and at ease, willingness to answer questions, and the ability to communicate the subject matter to the participants.
100.0% indicated they would take another course with this instructor.

Participant comments on the instructor include:

* "Excellent instructor. A pleasure to meet and work with."
* "Very good instructor, well prepared, made the class interesting."
* "I would take more [classes], but I think it should be on things we have problems on like fractions in stand (sp) of + and - items."
* "Nancy was excellent I found out firstly (sp) how much I didn't know and remember. She was so very helpful to us."
* "Nancy delivereds (sp) information very well."
* "Very nice lady and a good and patient teacher."
* "She was very helpfull (sp) and exspaind (sp) everything in detail.
* "She was very clear on what to do and how to do it."
* "Our instructor delivered information very well. She helped me understand alot of problems I had some misunderstanding on."

FACILITIES:

86.7% rated the quality of the training room very good or excellent.
96.7% agreed that the necessary supplies were available to them.

Participants' comments included the following:

- "I feel much better about decimals, such as division."
- "Not enough room to work at computers comfortably and too noisy."
- "Enjoyed the class."

INSTRUCTOR COMMENTS:

Thirty-one participants were administered a pre-assessment on their first day of the course and a post-assessment on their last day. Every participant showed improvement by the end of the course. The average pre-assessment score was 43%. The average post-assessment score was 66%--a significant improvement of 23%. Individual scores increased from a low of 6 to a high of 43 percentage points. Many participants expressed their surprise and pleasure that they improved their math skill in such a short time. Others indicated that they are now ready to learn; during their years of formal schooling, they were not as interested in learning.

Attendance was above average. Class participation varied with the time of day, supervisor/subordinate present in same class, and topic of discussion. Skepticism of training program ran high, at first. This skepticism showed in their reaction to identifying errors, omissions, inconsistencies in course materials. Several participants were delighted whenever they were the first to recognize an undetected error--at times I felt that they were keeping score! To help alleviate this problem, after Sessions 5 and 10, I shared with UTC staff member proposed changes to make prior to second printing of course. An "ideal" arrangement would be to have all materials proofread by instructor or other interested party prior to reproduction, but time and cost may hinder the implementation of this recommendation.

The installation of a ceiling fan in the training room aided the comfort level of the participants. It was welcomed addition!

Two areas receiving the lowest scores on the Evaluation Form are discussed below:

76.7% agreed that the amount of time allotted for the course was adequate.

Several participants indicated that they were insulted by reviewing basic arithmetic--adding, subtracting, multiplication, and division of whole numbers. More time, they indicated, should have been spent with fractions and decimals.

To provide participants with exercises in these specific areas, I developed and distributed worksheets for their off-the-job time and I encouraged them to use their computer time to explore fractions and decimals in greater depth.

73.3% agreed that this course has practical application to their job.

Several of the 26.7% who disagreed with this statement were disappointed that their TABE score placed them in this level of Mathematics-on-the-Job. Several felt that if they were tested again, their score would be much higher. Now that they have successfully passed the Math I course, I am convinced that their scores will be higher!

76.7% rated the text instructional aid helpful.

The participants' comments and my concerns are discussed above.

The staff members at CWP have been extremely helpful, courteous, and very accommodating to see that this Workplace Literacy Program runs smoothly. It has been a rewarding experience for me to be playing a role in their first basic skills venture. The recognition luncheon for student participants was the icing on the cake!

CLEVELAND WOOD PRODUCTS

MATHEMATICS-ON-THE-JOB II
April 20, 1993 - May 20, 1992

EVALUATION SUMMARY

Instructor: Nancy Hoffstadt Date: May 24, 1993

COURSE EXPECTATIONS:

88.2% agreed that the course content met their expectations.
88.2% agreed that they had the necessary skills and knowledge necessary to take the course.
58.8% agreed that the amount of time allotted for the course was adequate.

Comments:
"Too much material to remember"

COURSE CONTENT:

58.8% agreed that this course will help them do their job more effectively.
76.5% agreed that this course has practical application to their job.
100.0% rated their overall impression of this course high.
94.1% agreed that the objectives of this course were clearly stated.
70.6% agreed that the course met the stated objectives.

Participants' comments on the most useful information presented in this course was as follows:
"The word problems relating to my job" (2 responses)
"Fractions (2 responses) and per cents"
"All the information was helpful to me."
"Solving the problems presented in class"
"Gauge readings"
"All was great review."
"Only skids + ctn + daily production and man hours"
"Positive and negative numbers"

Participants' comments on the least useful information presented in this course were as follows:
"Absolute value"
"Ratios"
"The computer, because of time"
"Not enough time to practice information presented"
"Fractions"

Participants' comments on the least useful information (continued):

"Multiplication and division of decimals"
"The algebra"

METHODS OF INSTRUCTION:

88.2% agreed that there were sufficient exercises/practice with new skills and concepts.
100.0% rated the instructional materials (textbook/workbook, syllabus/outline, and audio-visual aids) helpful.
58.8% rated the computer-based training helpful.
94.1% rated the instructional methods/aids (text, lecture, exercises, discussions, and Q & A) helpful.
100.0% agreed that the materials were well organized.

Participants' comments included the following:

"Was not job-related enough"
"Needed more time on sections"
"Would have liked more variety of extra materials to do on own time"

INSTRUCTOR:

100.0% rated the instructor excellent on organization and preparation, mastery of subject matter, ability to make participants to feel welcomed and at ease, willingness to answer questions, and the ability to communicate the subject matter to the participants.
100.0% indicated they would take another course with this instructor.

Participant comments on the instructor include:

"Nancy was very helpful with anyone who had problems or questions."
"Liked the instructor"
"Xcellent"
"Nancy is very patient and comfortable to be around."

FACILITIES:

94.1% rated the quality of the training room very good or excellent.
100.0% agreed that the necessary supplies were available to them.

Participants' comments on the facilities include:
"Too warm in room--had difficulty staying awake"
"Not enough room for computers" (2 responses)
"Not enough time" (2 responses)
"Not enough computer time allowed--after 42 years out of school, this class made me dwell too deep into my memory. It gave me a headache."
"Not enough computer time" "Need separate room for computer lab time"
"Would have liked a little more time to learn and absorb material"
"Overall a very rewarding and educational experience"

INSTRUCTOR COMMENTS:

Sixteen participants were administered a pre-assessment on their first day of the course and a post-assessment on their last day. Every participant showed significant improvement by the end of the course. The average pre-assessment score was 42.4%. The average post-assessment score was 79.0%--a significant improvement of 36.6 percentage points. Individual scores improved from a low of 6 to a high of 60 percentage points. The participant with the highest pre-assessment score (86%) improved by the least number of points (6), and the participant with the lowest pre-assessment score (17%) improved by the largest number of points 60). Many participants were very proud of their success and verbally expressed their pleasure and gratitude in having the opportunity to participant in this worksite training program.

Attendance was well above average. Participants indicated their willingness to attend. When an absence did occur, materials were presented to the participants upon their return. Other participants willingly shared notes with absent class members.

The individual categories on the Evaluation Form that received the lowest scores are discussed below:

58.8% agreed that the amount of time allotted for the course was adequate.

To absorb and retain information within a five-week period, the participants were encouraged to review and practice new material. As homework is not a requirement of the course, I reviewed the prior lesson at each new lesson and used all the supplemental appendix problems that were provided with many of the lessons. In addition, I developed and distributed several handouts for those seeking additional practice. Nine out of sixteen participants used these handouts.

Some of the participants who indicated that the time allotted for the course was less than adequate also indicated to me that they wanted to stay longer, extend the course, or do more math problems because they didn't want to return to work. They found math fun--not work!

58.8% agreed that this course will help them do their job more effectively.

This issue was more of a concern to the participants before they got involved in job-related word problems, than after. They did perk up their interest level once these problems surfaced.

58.8% rated the computer-based training helpful.

The initial problems associated with the implementation of the computer programs are now minimized. Sharing time with another, cramped quarters, and on-going schedule changes have been eliminated, now that there is only one per computer, workstations have been spread out, and the final schedule is in place in week #2 of the new round of classes.

In addition to the above comments, I found the participants an enjoyable group to work with who demonstrated a high level of cooperation. Student participation varied with each class, depending upon, in part, who their classmates were. Supervisor/subordinate relationships hindered open communication by some.

This Math II course provided all participants with the opportunity to think, to analyze, and to apply their knowledge and ability to use numbers effectively. Many participants found that the Skills Bank computer program provided them with the opportunity to reinforce their classroom learning.

INSTRUCTOR:

71% rated the instructor excellent in every category (average score 4.8 out of 5.0).
100% would definitely take another course with this instructor.

Comments:

No comments.

FACILITIES:

86% felt the training room was adequate.
100% felt necessary supplies were available to them.

Comments:

- Allowing drinks and food would have been nice.

INSTRUCTOR COMMENTS:

This class seemed to be rather interested in math, but many couldn't see the relation between what we were doing in class and what was required on the job. (In fact, some participants insisted that they do not do any math on the job, or that the supervisors do it.) Pre-test scores ranged from a low of 21% to a high of 77%; by the ***post-test***, the range was ***53% to 99% !*** The average improvement was 28%.

Given the initial math levels of the participants, I feel that the curriculum progressed much too fast. I slowed down considerably in order to have participants feel a sense of accomplishment rather than frustration, and was able to cover only five and a half of the nine modules provided.

There was considerable resistance at the beginning of the session to the possibility that the participants might be asked to do "homework" outside of class. I went to great pains to reassure them that it would never be required, but I might occasionally give them the option of doing some outside worksheets. The participants seemed to enjoy the class, and by the middle of the five weeks, a few were asking for additional worksheets to practice outside of class. Those who did the worksheets showed increased mastery of the material, and this comfort was transmitted to other members of the class, many of whom eventually asked for extra work. Some members of the class expressed their regret that the class was ending so quickly. It seemed that they had just begun to feel comfortable doing math again, and then the session ended. Many commented that they would like to continue with math.

CLEVELAND WOOD PRODUCTS
MATHEMATICS ON THE JOB II

April 19, 1993 - May 21, 1993

Instructor: Marianne Canario
Sections Number: 30405

May 23, 1993
No. of Participants: 10

COURSE EXPECTATIONS:

100% agreed that the course content met their expectations.
86% agreed that they had the necessary skills and knowledge to take the course.
86% agreed that the amount of time allotted for the course was adequate.

Comments:

- Need more time; trying to cram too much into course.

COURSE CONTENT:

71% agreed that the course will help them do their job more effectively.
71% agreed that the course had practical application to their job.
86% of participants rated this course very good or excellent.
100% agreed that the objectives of the course were clearly stated.
100% agreed that the course met the stated objectives.

Comments on most useful information presented:

- Algebra

Comments on least useful information presented:

No comments.

METHODS OF INSTRUCTION:

100% agreed that there were sufficient exercises and practice with new skills/concepts.
100% rated all the instructional materials and classwork helpful.

Comments:

- I enjoyed being in Communications I and having Marianne as a teacher.

CLEVELAND WOOD PRODUCTS
COMMUNICATIONS ON THE JOB II

May 24, 1993 - June 30, 1993

Instructor: Marianne Canario
Sections Number: 30502/30503

June 30, 1993
No. of Participants: 24

COURSE EXPECTATIONS:

96% agreed that the course content met their expectations.
96% agreed that they had the necessary skills and knowledge to take the course.
100% agreed that the amount of time allotted for the course was adequate.

Comments:

- I enjoyed this class very much. It was fun.
- Course was not really what I expected.

COURSE CONTENT:

83% agreed that the course will help them do their job more effectively.
78% agreed that the course had practical application to their job.
61% of participants rated this course very good or excellent (another 35% rated it satisfactory.
100% agreed that the objectives of the course were clearly stated.
100% agreed that the course met the stated objectives.

Comments on most useful information presented:

- I though everything we learned was useful.
- How to communicate by listening and speaking.
- Trying to rephrase your commens using an I-message approach.
- How to be more specific when complimenting someone.
- The other workers and supervisors talking about good and bad work situations.
- I learned there is more than one way to learn something.
- None.

Comments on least useful information presented:

- All.
- At times it was just too easy!

METHODS OF INSTRUCTION:

100% agreed that there were sufficient exercises and practice with new skills/concepts.
100% rated the textbook helpful.
81% rated the computer-based training helpful.

Comments:

No comments.

INSTRUCTOR:

65% rated the instructor excellent in every category.
100% would definitely take another course with this instructor.

Comments:

- Marianne made the classes enjoyable, which made anxiety go away.
- Marianne did a very good job.
- Good instructor, well prepared. Made the class fun.
- She made the class very enjoyable.

FACILITIES:

95% felt the training room was adequate.
100% felt necessary supplies were available to them.

Comments:

- Room could be a little cooler.
- Room was stuffy at times but other times it was fine.
- Room could have been larger.

INSTRUCTOR COMMENTS:

These two classes were very enjoyable for me. Participants were not reluctant to participate and state their opinions, which allowed for a lively discussion in nearly all class meetings. Pre-test scores, as always, were somewhat low, ranging from 37% to 78%. By the end of the five weeks, however, several participants earned 100% on their post-test, and the low was a much more respectable 70%. Individual score increases ranged from 15% to a very high 57%, with the average improvement being 32%.

Although there was some sentiment that the Communications class was not as useful as the math, individuals willingly participated in class activities and discussions. On a CWP-sponsored survey asking whether participants would be interested in taking more classes, and which those might be, one individual in my class wrote, "Excellent training, very good presentation. Reminds us of areas which we all use but tend to take for granted or forget." This seemed to summarize several oral comments I received, about the fact that much of good communications skill is common sense and common (not commonly used) courtesy. Of the 20 people who responded to the CWP survey, ten asked for a Communications III class.

CLEVELAND WOOD PRODUCTS
MATHEMATICS ON THE JOB I

May 24, 1993 - June 30, 1993

Instructor: Marianne Canario **June 30, 1993**
Sections Number: 30507 **No. of Participants: 6**

COURSE EXPECTATIONS:

100% agreed that the course content met their expectations.
100% agreed that they had the necessary skills and knowledge to take the course.
0% agreed that the amount of time allotted for the course was adequate.

Comments:

No comments.

COURSE CONTENT:

100% agreed that the course will help them do their job more effectively.
100% agreed that the course had practical application to their job.
100% of participants rated this course excellent.
100% agreed that the objectives of the course were clearly stated.
100% agreed that the course met the stated objectives.

Comments on most useful information presented:

- Tolerances (5 times)
- Use of calculators (4 times)
- Charts from the floor (3 times)
- Reading numbers (4 times)
- Everything

Comments on least useful information presented:

No comments.

METHODS OF INSTRUCTION:

100% agreed that there were sufficient exercises and practice with new skills/concepts.
100% rated all the instructional materials and classwork helpful.

Comments:

No comments.

INSTRUCTOR:

100% rated the instructor excellent in every category.
100% would definitely take another course with this instructor.

Comments:

- She's a very good teacher and I like her very much. (2 times)
- Very nice, a wonderful person
- Very nice teacher, very nice person.
- Loved her.

FACILITIES:

100% felt the training room was adequate.
100% felt necessary supplies were available to them.

Comments:

- We want another course! (5 times)

INSTRUCTOR COMMENTS:

This was a very difficult class to teach, in that virtually all of the participants had had bad experiences with math in school. There was a lack of understanding of even the elementary concepts of addition, subtraction, multiplication and division. This was evidenced by the pre-test scores, which ranged from a low of 28% to a high of 71%. The difficulty was further compounded by the fact that several of them spoke English poorly.

There was also a great diversity of ways to solve problems, given the three cultures represented in the room. (Each culture approaches math problems in a different way, and even borrowing and carrying were performed in a variety of manners.) Consequently, I focussed on the ***thought processes*** behind the math problems, as well as on the use of the calculator. We concentrated on word problems and charts used on the floor at Cleveland Wood, and I feel that great strides were made.

The progress of the class was quite slow: of the ten modules prepared, this class was able to cover only four modules. However, progress during the last two weeks was considerably faster than during the first three weeks; I think that once the individuals began thinking about math again, some of it came back to them.

By the end of the five-week session, participants even felt free to point out when I (purposely) made mistakes on the board! When asked, they were able to give common-sense reasons why my answers were not correct; ***this was a great enhancer of their self-esteem.*** Participants were amazed at their ability to solve word problems, and ***all made significant progress*** in their mathematical abilities during the five weeks. The post-test scores were significantly better than the pre-test, and ***ranged from a low of 68% to 84% !!*** The greatest improvements were made by two participants, one of whom ***improved by 55%, and the other improved by 51% !*** All participants attempted to do extra problems on the post-test which had not been covered in class. To reward this initiative, I gave extra credit points for those problems, and the results were amazing: ***including extra credit, one participant scored 95%, and all the others scored 100% !!*** As shown here, the biggest gain in these participants was an improved sense of their capabilities, and a ***willingness to try math problems.*** Participants were just glowing with pride when they received their post-test scores.

This was an extremely rewarding class for me. The greatest challenge was to encourage a positive attitude towards math, and to reassure participants that it is all right to make mistakes, especially if the logic behind the problem is correct. Without exception, all the participants were anxious to continue with the classes, and would like to continue with both math and English. I feel that this was a very successful experience for all concerned.

CLEVELAND WOOD PRODUCTS
MATHEMATICS-ON-THE-JOB I

May 25 - June 24, 1993

EVALUATION SUMMARY

Instructor: Nancy Hoffstadt Date: June 24, 1993

COURSE EXPECTATIONS:

100.0% agreed that the course content met their expectations.
100.0% agreed that they had the necessary skills and knowledge necessary to take the course.
80.0% agreed that the amount of time allotted for the course was adequate.

COURSE CONTENT:

100.0% agreed that this course will help them do their job more effectively.
60.0% agreed that this course has practical application to their job.
100.0% rated their overall impression of this course high.
100.0% agreed that the objectives of this course were clearly stated.
100.0% agreed that the course met the stated objectives.

Participants' comments on the most useful information presented in this course were as follows:

- "Everything" (2 responses)

METHODS OF INSTRUCTION:

100.0% agreed that there were sufficient exercises/practice with new skills and concepts.
100.0% rated the instructional materials (textbook/workbook, syllabus/outline, audio-visual aids) most helpful.
100.0% rated the computer-based training helpful.
100.0% rated the instructional methods/aids (text, lecture, exercises, discussions, and Q & A) most helpful.
100.0% agreed that the materials were well organized.
100.0% rated the instructional methods/aids (text, lecture, exercises, discussions, and Q & A) most helpful. Videotapes were not applicable to this course.
100.0% agreed that the materials were well organized.

INSTRUCTOR:

100.0% rated the instructor excellent on organization and preparation, mastery of subject matter, ability to make participants to feel welcomed and at ease, willingness to answer questions, and the ability to communicate the subject matter to the participants.

100.0% indicated they would take another course with this instructor.

FACILITIES:

20.0% rated the quality of the training room very good or excellent.

80.0% agreed that the necessary supplies were available to them.

Participants' comments on the facilities include:

- "Very hot in training room" (2 responses)
- "Need more air"
- "Afternoon classes very hot"

INSTRUCTOR COMMENTS:

The Mathematics-on-the-Job I participants appeared to be a close-knit group of employees who enjoyed learning together. To capitalize on their eagerness to work together, I encouraged teamwork and groupwork activities. I did find that there was a wide range of speed and ability in solving math problems; however, the six participants did not appear to be hindered or frustrated by the varying speed or ability levels.

Participants requested additional worksheets to assist them in their math skills. They were all exposed to the Appendix problems (which I found very worthwhile and extremely helpful), and time was taken during each class to review them. In addition, I developed worksheets for homework that I then reviewed with them in class. The majority of participants were unprepared to review the worksheets, despite their request for them. Attendance in the computer lab for the Math I students was below average. On several occasions, scheduled students would be a "No Show."

The heat in the afternoons made the training room uncomfortable on many occasions. The participants' energy level was greatly affected by their lack of comfort.

All six participants were administered a pre-assessment on the first day of the course and a post-assessment on the last day. Every participant showed improvement by the end of the course.

The average pre-assessment score was 37.5%. The average post-assessment score was 63.8%--a significant improvement of 26.3%. Individual scores improved from a low of 1 to a high of 47 percentage points. Many participants were very proud of their results, as I was of them. The one participant who only increased her score by 1 percentage point was absent three sessions, and she did not show much interest in taking the time to check her work.

It was my personal goal to encourage the importance of checking work and to follow through with each problem from beginning to end. Many participants appeared to be in a hurry to get to the answer--any answer--and then move on to another problem.

Attendance was above average. Absentees were provided with materials and supplies when they returned to class, and they were encouraged to seek help as they made up the work.

Additional time was used in class to answer individual questions. Many participants who had a weak familiarity with word problems were encouraged to do the 5-step process for every new problem. As they discovered they could be successful, their self-esteem increased and they were less timid about trying new problems as they progressed through the course.

This Math I course provided the six participants with the opportunity to work together in a learning environment, to think, to analyze, and to demonstrate their knowledge and ability to use basic math effectively.

CLEVELAND WOOD PRODUCTS
COMMUNICATIONS-ON-THE-JOB II

May 25 - June 24, 1993

EVALUATION SUMMARY

Instructor: Nancy Hoffstadt　　　Date: July 5, 1993

COURSE EXPECTATIONS:

59.4% agreed that the course content met their expectations.
90.6% agreed that they had the necessary skills and knowledge necessary to take the course.
96.9% agreed that the amount of time allotted for the course was adequate.

Participant comment:

- I don't think I would have signed up voluntarily."

COURSE CONTENT:

59.4% agreed that this course will help them do their job more effectively.
56.3% agreed that this course has practical application to their job.
78.1% rated their overall impression of this course high.
90.6% agreed that the objectives of this course were clearly stated.
87.5% agreed that the course met the stated objectives.

Participants' comments on the most useful information presented in this course was as follows:

- "How to become a good listener"
- "It showed me what type of a learner I was."
- "I like reviewing and learn things I had forgot or didn't know."
- "The helping of one to understand better the meaning of things, how they are phrased, and comprehension."
- "Subject matter about dealing with people."
- "Definitation (sp) were the most useful information."
- "Some of the words and meanings of job-related things in general."
- "Blueprint reading was the best yet least touched on."
- "Getting along with co-workers."
- "The proper way to abroch (sp) a person or subject."

Most useful information (continued):

- "Use of proper words when speaking to other people."
- "My vocabulary skills."
- "All information was useful."

Participants' comments on the least useful information presented in this course were as follows:

- "Instruction about the dictionary" (3 responses)
- "The meanings of words that do not pertain to my job. I don't make the repairs on the machines."
- "Memo writing"
- "Reading habits"
- "Some of the words we were asked to learn I have never heard in 5 years at CWP I feel are irrelevent (sp). There are others that could/should have been used."
- "None"

METHODS OF INSTRUCTION:

93.8% agreed that there were sufficient exercises/practice with new skills and concepts.
93.8% rated the instructional materials (textbook/workbook, syllabus/outline, and audio-visual aids) helpful.
81.3% rated the computer-based training helpful.
93.8% rated the instructional methods/aids (text, lecture, exercises, discussions, and Q & A) helpful.
93.8% agreed that the materials were well organized.

INSTRUCTOR:

100.0% rated the instructor excellent on organization and preparation, mastery of subject matter, ability to make participants to feel welcomed and at ease, willingness to answer questions, and the ability to communicate the subject matter to the participants.
100.0% indicated they would take another course with this instructor.

Participant comments on the instructor include:

- "Excellent instructor"
- "Nancy was very nice as a person and teacher. She has the personally (sp) that makes it easy to want to learn more. Very pleasant person."
- "Nancy was very nice and helpful in every way needed to teach."
- "It was more enjoyable because of this teacher."

FACILITIES:

84.4% rated the quality of the training room very good or excellent.
96.7% agreed that the necessary supplies were available.

Participants' comments on the facilities include:

- "I enjoyed the class and learned a lot."
- "Room should be bigger--have a few more computers to use."

INSTRUCTOR COMMENTS:

Thirty-six participants were administered a pre-assessment at the beginning of the course and thirty-three participants were administered a post-assessment on their last day. Two participants left the Company prior to the end of the five-week course and one participant completed only two weeks of the course. All participants who completed the course showed improvement by the end of the course.

The average pre-assessment score was 45.6%. The average post-assessment score was 75.5%--a significant improvement of 29.9 percentage points. Individual scores improved from a low of 6 to a high of 55 percentage points. Many participants were very proud of their success and verbally expressed their pleasure and gratitude in having the opportunity to participate in this worksite training program.

One supervisor who completed the course expressed how the participants' self-esteem improved as a result of training. The employees have gained more self-confidence. He saw his people less resistant to change and more willing to try something new.

Attendance was well above average. Participants indicated their willingness to attend. When an absence did occur, materials were presented to the participants upon their return. Other participants willingly shared notes with absent class members.

At times I felt that participants could have benefited from additional material. They enjoyed role playing activities. They appeared eager for those activities where interaction with class members was paramount. Developing dictionary skills was done by participants half-heartedly. A variety of learning techniques and activities need to be incorporated into course to keep interest level high.

Open communication is hindered by supervisors/managers in same class as non-supervisors/non-managers.

This course provided participates with an opportunity to "check out" and develop their listening, learning, and reading skills.

PARTICIPANT EVALUATION SUMMARY
TRW VALVE DIVISION GRANT DELIVERY

January 26 - June 30, 1993

1 TRW Valve Division Evaluation Summary

PARTICIPANT EVALUATION SUMMARY
TRW VALVE DIVISION GRANT DELIVERY - January 26 - June 30, 1993

Overall averages for Evaluation Form responses from grant classes.

COURSE EXPECTATIONS:

89% agreed the course content met their expectations.
78% agreed that they had the necessary skills and knowledge necessary to take courses.
66% agreed that the amount of time allotted for the courses was adequate.

COURSE CONTENT:

77% agreed that courses would help them do their jobs more effectively.
68% agreed that courses had practical application to their jobs.
91% rated their overall impression of courses as high.
89% agreed that course objectives were met.

METHODS OF INSTRUCTION:

87% agreed there were sufficient exercises/practice with new skills and concepts.
90% rated instructional materials (textbook/workbook, syllabus/outline, and audio-visual aids) most helpful.
91% rated instructional methods/aids (text, lecture, exercises, discussions, Q&A, and videotapes) most helpful.
64% rated computer-based training helpful.
91% agreed that materials were well organized.

INSTRUCTORS:

93% rated instructors excellent on organization and preparation, master of subject matter, ability to make participants feel welcomed and at ease, willingness to answer questions, and the ability to communicate subject matter to the participants.

98% indicated they would take another course with their instructor.

FACILITIES:

61% rated the quality of the training rooms as very good or excellent.
99% agreed that the necessary supplies were available to them.
Selected participant comments are included on the attached instructor evaluation summary sheets.

TRW

COMMUNICATIONS ON THE JOB II

April 13, 1993 - June 22, 1993

Instructor: Marianne Canario **June 30, 1993**
Sections Number: 30391/30392 **No. of Participants: 25**

COURSE EXPECTATIONS:

91% agreed that the course content met their expectations.
100% agreed that they had the necessary skills and knowledge to take the course.
79% agreed that the amount of time allotted for the course was adequate.

Comments:

- Need more time.

COURSE CONTENT:

75% agreed that the course will help them do their job more effectively.
74% agreed that the course had practical application to their job.
83% of participants rated this course very good or excellent (another 9% rated it satisfactory.)
100% agreed that the objectives of the course were clearly stated.
96% agreed that the course met the stated objectives.

Comments on most useful information presented:

- I learned some ***definitions*** regarding my job.
- The importance of attitude and not over-reacting.
- Knowing what words to use and when to use them.
- The different ways of reading.
- Helps you believe in yourself.

Comments on least useful information presented:

No comments.

METHODS OF INSTRUCTION:

100% agreed that there were sufficient exercises and practice with new skills/concepts.
100% rated the textbook helpful.
61% rated the computer-based training helpful.**

Comments:

No comments.

** This was an interesting rating, given that none of the 25 participants used the computer lab for communications work, to the best of my knowledge. This rating may reflect participants' experience with the math programs on computer.

INSTRUCTOR:

43% rated the instructor excellent in every category.
100% rated the instructor very good or excellent in her ability to make the participants feel welcome and at ease.
100% would definitely take another course with this instructor.

Comments:

- The instructor was the best!
- She made you feel at east and comfortable.
- I've learned a great deal.
- Marianne was wonderful; I enjoyed her pleasant personality.
- She knew the material very well, and was able to convey it; she's a people person.
- Marianne is a good teacher. (2 times)

FACILITIES:

74% felt the training room was adequate.
100% felt necessary supplies were available to them.

Comments:

- TRW management/supervisors need a course in Communications (11 times)
- Extremely cold room, even in cold weather.
- Cancellation of classes or other necessary data re classes should be posted at bottom of stairs -- not upstairs.
- Room always either too hot or too cold.
- Needed a better dictionary; most of our words weren't in it.

INSTRUCTOR COMMENTS:

These two sessions of Communications were very interesting for me; participants brought their real-life communications problems to class for our discussion, and although there are no easy answers, I believe that some of the techniques we discussed may be helpful to them. Many participants (11 out of 25) wrote on the evaluations that they believe that TRW management and supervisors need to take a course such as this. I agree with them; it is often helpful if most of the people in the company share a common vocabulary and knowledge of good communication principles.

The format of these classes was different from that of the other companies we work with, in that there is only one class per week. This was sometimes problematic; quite often participants forgot to come to class, and occasionally a class member went back down to the floor to remind them to come up. There were also quite a few participants who apparently dropped out, or never came to even one class. Nevertheless, those who attended on a consistent basis seemed to enjoy class and find it useful. As sometimes happens, some participants did not see the relationship between the class and their work; approximately 75% felt that it would help them do their work better.

As usual, there was a significant difference between pre-test and post-test scores. The range of scores on the pre-test was from 42% to 79%. The post-test range was from 80% to 100%, with several individuals earning the 100%. Average improvement was 36%.

I feel that some work needs to be done on presenting the vocabulary of the given company. It became tiresome to look up words in the dictionary at each class, only to find that very few of them were listed, even in the technical dictionary. There were also two occasions where participants disagreed about the meaning of words, and since there was no answer key, and the words were not listed in the dictionary, I had no way to settle the matter to our satisfaction. Most often, when conflicts on definitions arose, I tried to reach consensus among the class members, but I don't believe this is as effective as ***knowing*** the real definition.

Nearly all of the participants thanked me individually, and said that they had enjoyed the class, and found it to be worthwhile. Several asked about future classes, mentioning computer and blueprint classes.

TRW MATHEMATICS-ON-THE-JOB I
April 14 - June 16, 1993

EVALUATION SUMMARY

Instructor: Nancy Hoffstadt   Date: June 20, 1993

COURSE EXPECTATIONS:

100.0% agreed that the course content met their expectations.

85.7% agreed that they had the skills and knowledge necessary to take the course.

90.5% agreed that the amount of time allotted for the course was adequate.

COURSE CONTENT:

95.2% agreed that this course will help them do their job more effectively.

95.2% agreed that this course has practical application to their job.

100.0% rated their overall impression of this course above average.

100.0% agreed that the objectives of this course were clearly stated.

100.0% agreed that the course met the stated objectives.

Participant comments on the most useful information presented in this course are as follows:

- "Decimals, fractions, percents" (2 responses)
- "Refreshing"

METHODS OF INSTRUCTION:

100.0% agreed that there were sufficient exercises/practice with new skills and concepts.

100.0% rated the instructional materials (textbook/workbook, syllabus/outline, and audio-visual aids) most helpful.

75.0% rated the computer-based training helpful.

100.0% rated the instructional methods/aids (text, lecture, exercises, discussions, Q & A, and videotapes) most helpful.

100.0% agreed that the materials were well organized.

Participant comments on the methods of instruction include the following:

- "I wish I had more time."
- "Interesting and valueable (sp)."
- "Not long enough. There needs to be two more weeks before you take the test."

INSTRUCTOR:

100.0% rated the instructor excellent on organization and preparation, mastery of subject matter, ability to make participants to feel welcomed and at ease, willingness to answer questions, and the ability to communicate the subject matter to the participants.

100.0% indicated they would take another course with this instructor.

Participant comments on the instructor include the following:

- "Nancy Hoffstadt is very nice and great with us."
- "Took the time to make sure you understood, and I need that help."
- "I had a very good instructor. I had a lot of personal problems that interfered."
- "Precise and understanding."

FACILITIES:

76.2% rated the quality of the training room very good or excellent.

100.0% agreed that the necessary supplies were available to them.

Participant comments on the facilities include the following:

- "Too cool at times" (2 responses)
- "Yes, everything is O.K. by me."

INSTRUCTOR COMMENTS:

The Mathematics-on-the-Job I participants were an enjoyable group of individuals to work with. They showed a strong interest in increasing their basic math knowledge throughout the 10-week course.

Attendance was above average. Planned vacations accounted for the #1 reason why employees missed classes. Frequently, employees came to class very tired and lethargic--they indicated that overtime hours were frequent and two-day weekends were infrequent. Their work schedules prevented many participants from devoting personal time to homework or review of prior class material, even though many of them wanted and received worksheets and review sheets for home use.

The computer lab was underutilized during this course. On three occasions, I accompanied the classes to the lab, demonstrated programs, and observed their progress. The majority of students gained familiarity with the Skills Bank and many indicated a desire to continue in the lab. However, as no work time was allotted for computer usage, the employees participated in the lab very infrequently. Throughout the 10-week session, 10 participants used the computer lab with 1 - 4 number of visits per participant.

Twenty-four TRW employees began this Math I course. Twenty-one participants successfully completed the course. Three participants were unsuccessful because of the following reasons: 1) an extended sick leave, 2) a change in work shift with no coverage at worksite to attend class, and 3) a transfer to Math II to better accommodate his proficiency level.

Many of the participants expressed a desire to continue with this workplace training. It was evident that their self-esteem showed a remarkable increase in maturity as they experienced successes throughout the course.

Ninety-five percent of the participants showed a gain from their pre-test and post-test scores. The one participant who did not increase her score was experiencing much stress in her personal life at the time of her post-test and "went blank." Following the post-test, I talked with her and reviewed the material orally. She exhibited a level of math knowledge through this oral review that greatly surpassed her score on the written test.

Pre-test assessment scores ranged from a low of 6/55 = 11% to a high of 41/55 = 75%. Post-assessment scores ranged from a low of 16/55 = 29% to a high of 51/55 = 93%. Gains ranged from a low of 2 points to a high of 26.5 points, from a low of 3 percentage points to a high of 48 percentage points.

Room temperature ranged between very cool to extremely warm on any given day. The temperature controls available in the training room appeared to be inoperable.

I found this course to be a rewarding, educational experience--both for me and for the participants. The participants were challenged to think about, to analyze, and to demonstrate their knowledge and ability to work with mathematics effectively. Their active participation contributed to their personal and educational growth and development.

TRW COMMUNICATIONS-ON-THE-JOB II
April 13, 1993 - June 29, 1993

EVALUATION SUMMARY

Instructor: Lisa Bonacci　　Date: July 6, 1993

COURSE EXPECTATIONS:

"The content of the course met my expectations"
65% strongly agree
35% agree

"I had the skills and knowledge necessary to take this course"
77% strongly agree
23% agree

"The amount of time allotted for course was adequate"
77% strongly agree
23% agree

Participant comments:
- None

COURSE CONTENT

"This course will help me do my job more effectively"
23% strongly agree
65% agree
12% strongly disagree

"This course has practical application to my job"
18% strongly agree
82 64% agree
18% strongly disagree

/ "Rate your overall impression of this course"
40% very high
60% high

"The objectives of this course were clearly stated"
65% strongly agree
35% agree

"The course met the stated objectives"
35% strongly agree
65% agree

COURSE CONTENT (continued)

Participant comments on most useful information presented in this course:
- "About Dictionaries"
- "How to deal with different personalities in job situations, example-positive feedback"
- "Importance of listening skills"
- "The different ways to communicate"

Participant comments on least useful information presented in this course:
- "Dictionary uses"
- "Definitions of words we use here"

METHODS OF INSTRUCTION

"There were sufficient exercises and practice with new skills and concepts"

46% strongly agree
54% agree

"Rate the helpfulness of the instructional materials"

-Textbook/workbook readings
54% very helpful
46% helpful

-Study-guide/syllabus/outline
60% very helpful
40% helpful

-Audio-visual aids
40% very helpful
54% helpful
6% not applicable

-Computer-based training
12% very helpful
18% helpful
23% not helpful
47% not applicable

"Rate the instructional methods and aids used"

-Text
40% very helpful
60% helpful

-Lecture
65% very helpful
35% helpful

METHODS OF INSTRUCTION (continued)

-Exercises
65% very helpful
35% helpful

-Class Discussion/Question and Answer
88% very helpful
12% helpful

-Videotape
35% very helpful
60% helpful
05% not helpful

"The materials were well organized"
70% strongly agree
30% agree

Participant comments:
* None in this section

INSTRUCTOR

"Rate the instructor on:
-Organization and preparation
77% excellent
23% good

-Mastery of subject matter
94% strongly agree
06% agree

-Ability to make participants feel welcome and at ease
94% excellent
06% good

-Willingness to answer questions
94% excellent
06% good

-Ability to communicate the subject matter to the participants
94% excellent
06% good

"Based on this experience, would you take another course with this instructor?"
100% yes

INSTRUCTOR (continued)

Participant comments:

- "Lisa seemed at ease and was very easy to get along with. She's an asset to the teaching profession."

FACILITIES

"Rate the quality of the training room, i.e., room of appropriate size, adequate lighting, heat, ventilation"

30% very good
46% good
24% not good

"Were the necessary supplies available to you?"

65% strongly agree
35% agree

Participant comments:

- "I learned a lot for my job and at home."
- "Instructor very helpful. Makes one feel at ease."
- "Room too cold"

All seventeen participants showed significant improvement from when they took the pre-assessment to when they took the post-assessment. All participants were very proud of their results.

Nine of the seventeen participants who completed the course had perfect attendance. The other participants only missed one or two classes.

Many students have inquired about classes for the future! All are interested.

TRW MATHEMATICS-ON-THE-JOB II

APRIL 15 - JUNE 24, 1993

EVALUATION SUMMARY

Instructor: Pamela Jones/Swee-Chin Otley/? **Date:** July 1, 1993
Section #: 30399
Class time: 3:00pm - 5:00pm

COURSE EXPECTATIONS:

100% agreed that the course content met their expectations.

100% agreed that they had the skills and knowledge necessary to take the course.

33% agreed that the amount of time allotted for the course was adequate.

COURSE CONTENT:

67% agreed that this course will help them do their job more effectively.

67% agreed that this course has practical application to their job.

67% rated their overall impression of this course above average.

100% agreed that the objectives of this course were clearly stated.

100% agreed that the course met the stated objectives.

Participants comments on the most useful information presented in this course are as follows:

- No feedback given on evaluations
- One student felt the algebra was very difficult and challenging

Participants comments on the least useful information presented in this course are as follows:

- No feedback given on evaluations

METHODS OF INSTRUCTION:

67% agreed that there were sufficient exercises/practice with new skills and concepts.

67% rated the instructional materials (textbook/workbook. and syllabus/outlines) most helpful.

100% rated the computer-based training useful.

73% rated the instructional methods and aids most helpful.

100% agreed that the materials were well organized.

INSTRUCTOR:

100% rated the instructor excellent on organization and preparation, mastery of subject matter, ability to make participants to feel welcomed and at ease, willingness to answer questions, and the ability to communicate the subject matter to the participants.

100% indicated they would take another course with this instructor.

FACILITIES:

67% rated the quality of the training room very good or excellent.

100% agreed that the necessary supplies were available to them.

Participants comments on the facilities include the following:

INSTRUCTOR COMMENTS:

Preassessment MEAN score 26/54 = 48%

Post-assessment MEAN score 28/54 = 51%

All participants showed improvement between Pre and Post-assessment scores.

All participants felt the length of training or instruction should have spanned over a longer period of time, more than an eleven week period.

Many participants were very interested in additional classes.

TRW MATHEMATICS-ON-THE-JOB II

APRIL 15 - JUNE 24, 1993

EVALUATION SUMMARY

Instructor: Pamela Jones/Swee-Chin Otley/? **Date:** July 1, 1993
Section #: 30398
Class time: 1:00pm - 3:00pm

COURSE EXPECTATIONS:

40% agreed that the course content met their expectations.

80% agreed that they had the skills and knowledge necessary to take the course.

20% agreed that the amount of time allotted for the course was adequate.

COURSE CONTENT:

40% agreed that this course will help them do their job more effectively.

20% agreed that this course has practical application to their job.

60% rated their overall impression of this course above average.

40% agreed that the objectives of this course were clearly stated.

20% agreed that the course met the stated objectives.

Participants comments on the **most** useful information presented in this course are as follows:

* Taking the time to teach the formulas for each problem

* The assigned practice homework

Participants comments on the **least** useful information presented in this course are as follows:

- * Too much material to cover in too short of a time period.
- * Felt workbook manual did not have enough and appropriate examples of all problems.
- * Being assigned three (3) different instructors made learning difficult.

METHODS OF INSTRUCTION:

20% agreed that there were sufficient exercises/practice with new skills and concepts.

60% rated the instructional materials (textbook/workbook. and syllabus/outlines) most helpful.

60% rated the computer-based training useful.

44% rated the instructional methods and aids most helpful.

20% agreed that the materials were well organized.

INSTRUCTOR:

76% rated the instructor excellent on organization and preparation, mastery of subject matter, ability to make participants to feel welcomed and at ease, willingness to answer questions, and the ability to communicate the subject matter to the participants.

80% indicated they would take another course with this instructor.

FACILITIES:

100% rated the quality of the training room very good or excellent.

100% agreed that the necessary supplies were available to them.

Participants comments on the facilities include the following:

- * No feedback given on evaluations.

INSTRUCTOR COMMENTS:

Pre-assessment MEAN score 13/54 = 24%

Post-assessment MEAN score22/54 = 41%

All participants showed improvement between Pre and Post-assessment scores, for the exception of one student's score remaining the same.

All participants felt the length of training or instruction should have spanned over a longer period of time, more than an eleven week period.

Many participants were very interested in additional classes.

TRW MATHEMATICS-ON-THE-JOB II
January 29 - April 8, 1993

EVALUATION SUMMARY

Instructor: Swee-Chin Otley
Section #: 30260
Class time: 3:00pm - 5:00pm

Date: April 29,1993

COURSE EXPECTATIONS:

60% agreed that the course content met their expectations.

40% agreed that they had the skills and knowledge necessary to take the course.

40% agreed that the amount of time allotted for the course was adequate.

COURSE CONTENT:

60% agreed that this course will help them do their job more effectively.

✓ 20% agreed that this course has practical application to their job.

✓ 100% rated their overall impression of this course above average.

80% agreed that the objectives of this course were clearly stated.

✓ 80% agreed that the course met the stated objectives.

Participants comments on the **most** useful information presented in this course are as follows:

* "Somebody cares. It was useful."

Participants comments on the **least** useful information presented in this course are as follows:

None.

METHODS OF INSTRUCTION:

✓ 80% agreed that there were sufficient exercises/practice with new skills and concepts.

✓ 90% rated the instructional materials (textbook/workbook. and syllabus/outlines) most helpful.

✓ 60% rated the computer-based training useful.

✓ 96% rated the instructional methods and aids most helpful.

100% agreed that the materials were well organized.

INSTRUCTOR:

100% rated the instructor excellent on organization and preparation, mastery of subject matter, ability to make participants to feel welcomed and at ease, willingness to answer questions, and the ability to communicate the subject matter to the participants.

100% indicated they would take another course with this instructor.

Participant's comments on the instructor:

- "The Instructors were very prepared."
- "All instructors were professional."
- "Having 3 different instructors in three weeks was not good."
- "The instructors really wanted to help."

FACILITIES:

40% rated the quality of the training room very good or excellent.

100% agreed that the necessary supplies were available to them.

OTHER ADDITIONAL COMMENTS:

- "I would like to take the course again."
- "I'm not sure if I should have started in Math II."
- "I feel Math I would have been better suited to start with."
- "I think everyone should start out in Math I.

INSTRUCTOR COMMENTS:

All the participants were very cooperative and willing to learn. One participant dropped out, however attendance from the rest of the participants was excellent.

Pre-assessment scores ranged from a low of 4/54 = 7% to a high if 9/54 = 17%. Post-assessment scores ranged from a low of 19/54 = 35% to a high of 47/54 = 87%. All participants showed an enormous improvement between their Pre-assessment and Post-assessment scores. The improvement scores ranges from a low of 20 percentage points to a high of 70 percentage points.

TRW MATHEMATICS-ON-THE-JOB II
January 29 - April 8, 1993

EVALUATION SUMMARY

Instructor: Swee-Chin Otley
Section #: 30261
Class time: 5:10pm - 7:10pm

Date: April 29, 1993

COURSE EXPECTATIONS:

100% agreed that the course content met their expectations.

40% agreed that they had the skills and knowledge necessary to take the course.

40% agreed that the amount of time allotted for the course was adequate.

COURSE CONTENT:

80% agreed that this course will help them do their job more effectively.

60% agreed that this course has practical application to their job.

100% rated their overall impression of this course above average.

100% agreed that the objectives of this course were clearly stated.

100% agreed that the course met the stated objectives.

Participants comments on the **most** useful information presented in this course are as follows:

* "Swee-Chin was very challenging and lot of fun, however unfortunately we don't use a lot of Algebra"

* "Just reminded me what I'm not capable of my Math skills"

* "All"

Participants comments on the **least** useful information presented in this course are as follows:

- "In real life situations and if I knew what to do with it I would excel much better (Nancy was really good too).
- "Please Excuse My Dear Aunt Sally"

METHODS OF INSTRUCTION:

100% agreed that there were sufficient exercises/practice with new skills and concepts.

88% rated the instructional materials (textbook/workbook. and syllabus/outlines) most helpful.

80% rated the computer-based training useful.

100% rated the instructional methods and aids most helpful.

100% agreed that the materials were well organized.

INSTRUCTOR:

100% rated the instructor excellent on organization and preparation, mastery of subject matter, ability to make participants to feel welcomed and at ease, willingness to answer questions, and the ability to communicate the subject matter to the participants.

100% indicated they would take another course with this instructor.

FACILITIES:

0% rated the quality of the training room very good or excellent.

100% agreed that the necessary supplies were available to them.

Participants comments on the facilities include the following:

- "Heat ventilation were very bad, either too hot or too cold. TRW's problem."
- "Ice cold room, was sick for 4 days - missed work!!"

INSTRUCTOR COMMENTS:

All the participants were very cooperative and willing to learn. Attendance above average.

Pre-assessment scores ranged from a low of 10/54 = 26% to a high if 18/54 = 33%. Post-assessment scores ranged from a low of 19/54 = 35% to a high of 31/54 = 57%. All participants showed an improvement between their Pre-assessment and Post-assessment scores. The improvement scores ranges from a low of 9 percentage points to a high of 38 percentage points.

TRW MATHEMATICS-ON-THE-JOB II
January 29 - April 8, 1993

EVALUATION SUMMARY

Instructor: Nancy Hoffstadt   Date: April 12, 1993

COURSE EXPECTATIONS:

97.1% agreed that the course content met their expectations.
82.9% agreed that they had the skills and knowledge necessary to take the course.
62.9% agreed that the amount of time allotted for the course was adequate.

COURSE CONTENT:

77.1% agreed that this course will help them do their job more effectively.
62.9% agreed that this course has practical application to their job.
100.0% rated their overall impression of this course above average.
94.3% agreed that the objectives of this course were clearly stated.
100.0% agreed that the course met the stated objectives.

Participant comments on the most useful information presented in this course are as follows:

- "Positive and negative numbers--number line"
- "Everything"
- "Fractions"
- "Algebra"

Participant comments on the least useful information presented in this course are as follows:

- "Temperature conversions"
- "None"
- "Too much, too soon"
- "The course was too jammed--should be stretched out--more time"
- "The reading problems"
- "Little was directly related to job."

METHODS OF INSTRUCTION:

91.4% agreed that there were sufficient exercises/practice with new skills and concepts.

94.3% rated the instructional materials (textbook/workbook, and syllabus/outline) most helpful.

77.1% rated the computer-based training helpful.
91.4% rated the instructional methods and aids most helpful.
100.0% agreed that the materials were well organized.

INSTRUCTOR:

100.0% rated the instructor excellent on organization and preparation, mastery of subject matter, ability to make participants to feel welcomed and at ease, willingness to answer questions, and the ability to communicate the subject matter to the participants.
100.0% indicated they would take another course with this instructor.

FACILITIES:

65.7% rated the quality of the training room very good or excellent.
100.0% agreed that the necessary supplies were available to them.

Participant comments on the facilities include the following:

- "A/C unit not working properly"
- "Room was too small and too cold"

INSTRUCTOR COMMENTS:

Although the Mathematics-on-the-Job II participants were hard-working, they were unable to use the computer lab on their own time for the additional practice that they needed to develop their math skills. They indicated that their work days were very long, and many of them had been working seven days a week since the beginning of the year. Several of the participants showed an interest in extending the course another two weeks to allow them computer time to refine their new math skills.

Attendance was above average. On rare occasions when a class member was absent, he or she would obtain class material upon return to class.

Pre-assessment scores ranged from a low of 7/54 = 13% to a high of 28/54 = 52% Post-assessment scores ranged from a low of 15/54 = 28% to a high of 50/54 = 93% All participants showed a gain between their Pre-Assessment and Post-Assessment scores. The gains ranged from a low of 5 points to a high of 31 points, from a low of 9 percentage points to a high of 57 percentage points.

Room temperature ranged between very cool to extremely warm on any given day. The temperature controls available in the training room appeared to be inoperable. TRW management was notified of the uncomfortable temeperature conditions in the training rooms.

Overall, I found the course to be a rewarding, educational experience--both for me and for the participants. The participants were challenged to think about, to analyze, and to demonstrate their knowledge and ability to use math effectively on the job.

TRW COMMUNICATIONS-ON-THE-JOB I
January 26 - April 6, 1993

EVALUATION SUMMARY

Instructor: Lisa Bonacci Date: April 6, 1993

COURSE EXPECTATIONS:

"The content of the course met my expectations"
87.5% strongly agree
12.5% agree

"I had the skills and knowledge necessary to take this course"
50.0% strongly agree
37.5% agree
12.5% strongly disagree

"The amount of time allotted for course was adequate"
75.0% strongly agree
12.5% agree
12.5% strongly disagree

Participant comments:
- "Should be longer, more days"

COURSE CONTENT

"This course will help me do my job more effectively"
50.0% strongly agree
50.0% agree

"This course has practical application to my job"
12.5% strongly agree
87.5% agree

"Rate your overall impression of this course"
62.5% very high
37.5% high

"The objectives of this course were clearly stated"
75.0% strongly agree
25.0% agree

"The course met the stated objectives"
75.0% strongly agree
25.0% agree

COURSE CONTENT (continued)

Participant comments on most useful information presented in this course:

- "All"
- "Learning more of the language and how to communicate"

Participant comments on least useful information presented in this course:

- "None"

METHODS OF INSTRUCTION

"There were sufficient exercises and practice with new skills and concepts"

87.5% strongly agree
12.5% agree

"Rate the helpfulness of the instructional materials"

-Textbook/workbook readings
87.5% very helpful
12.5% helpful

-Study-guide/syllabus/outline
87.5% very helpful
12.5% helpful

-Audio-visual aids
100.0% very helpful

-Computer-based training
12.5% very helpful
25.0% helpful
25.0% not helpful
37.5% not applicable

"Rate the instructional methods and aids used"

-Text
100.0% very helpful

-Lecture
100.0% very helpful

METHODS OF INSTRUCTION (continued)

-Exercises
100.0% very helpful

-Class Discussion/Question and Answer
100.0% very helpful

-Videotape
25.0% very helpful
50.0% helpful
12.5% not helpful
12.5% not applicable

"The materials were well organized"
100.0% strongly agree

Participant comments:

- "I enjoyed the class because of Lisa, I hope that she will continue"
- Five participants said, "Didn't have enough time" (for computer)

INSTRUCTOR

"Rate the instructor on:

-Organization and preparation
100.0% excellent

-Mastery of subject matter
100.0% strongly agree

-Ability to make participants feel welcome and at ease
100.0% excellent

-Willingness to answer questions
100.0% excellent

-Ability to communicate the subject matter to the participants
100.0% excellent

"Based on this experience, would you take another course with this instructor?"
100.0% yes

INSTRUCTOR (continued)

Participant comments:

- "Lisa was a very good instructor"
- "Instructor was very knowledgeable and was polite"

FACILITIES

"Rate the quality of the training room, i.e., room of appropriate size, adequate lighting, heat,ventilation"

12.5% very good
75.0% good
12.5% not good

"Were the necessary supplies available to you?"

100.0% strongly agree

Participant comments:

- "no heat sometimes"

All eight participants showed significant improvement from when they took the pre-assessment to when they took the post-assessment.

The average pre-assessment score was 28.0% and the average post-assessment score was 81.25%, an improvement of 53.25 percentage points. All participants were very proud of their results! (note - I did not include Charles, Herbert or Creasie as they did not take the final exam)

This Communications course provided these participants with the chance to use skills that they have not used for a long time. I think the participants feel more comfortable with skills like using the dictionary, sounding out a word that they do not know, and reading aloud.

My assessment is that the participants need some stronger phonics work ie. vowel sounds, pronunciation, syllabication, accents, etc. Many of these participants were at a lower level than some parts of the curriculum. For two of the students it was very difficult as English is their second language.

Some of the participants mentioned that they are concerned that the math courses they will be taking will be too hard. I assured them that it would match their abilities per the pre-Tabe test.

100.0% rated the instructional materials (textbook/workbook, and syllabus/outline) most helpful.
77.4% rated the computer-based training helpful.
✓100.0% rated the instructional methods and aids most helpful/
100.0% agreed that the materials were well organized.

INSTRUCTOR:

✓ 100.0% rated the instructor excellent on organization and preparation, mastery of subject matter, ability to make participants to feel welcomed and at ease, willingness to answer questions, and the ability to communicate the subject matter to the participants.
100.0% indicated they would take another course with this instructor.

Participant comments on the instructor include the following:

- "The teacher was excellent."
- "This course gave me a second chance."
- "I don't want to leave."
- "A pleasant person."
- "Our instructor was great. Took as much time as she could! Answered all questions!"
- "I would like to take Math II with this instructor. It was a pleasure."
- "The instructor did a very good job and made me feel more relaxed with the course."
- "Nancy made the learning process a lot easier than what I remember from my years in jr. high and high school. She seems to care that you learn and retain."

FACILITIES:

87.1% rated the quality of the training room very good or excellent.
96.8% agreed that the necessary supplies were available to them.

Participant comments on the facilities include the following:

- "Too hot and stuffy on some days."
- "Everything was wonderful. It was a pleasure."

INSTRUCTOR COMMENTS:

The Mathematics-on-the-Job I participants were a hard-working, motivated group of individuals. It was an enjoyable and refreshing experience for me to have worked with them throughout the ten-week period.

Attendance was outstanding. On rare occasions when a class member was absent, he or she would obtain class material upon return to class.

Pre-assessment scores ranged from a low of 12.5/55 = 23% to a high of 43.5/55 = 79% Post-assessment scores ranged from a low of 18/55 = 33% to a high of 55/55 = 100% All participants showed a gain between their Pre-Assessment and Post-Assessment scores. The gains ranged from a low of 1.5 points to a high of 35.5 points, from a low of 2 per cent to a high of 65 per cent.

Room temperature ranged between very cool to extremely warm on any given day. The temperature controls available in the training room appeared to be inoperable. TRW management was notified of the uncomfortable temeperature conditions in the training rooms.

In a course, such as this, computer time is strongly recommended and encouraged for those participants who can benefit from repetition and reinforcement of class information. Many of the Math I participants expressed a desire to use the computer lab, but because of lack of company time available to develop and/or expand their math skills, these participants were unable to benefit from the computer facility presently in place at TRW.

Overall, I found the course to be a rewarding, educational experience--both for me and for the participants. The participants were challenged to think about, to analyze, and to demonstrate their knowledge and ability to use math effectively on the job.

TRW Communications on the Job II Evaluation Summary
3:00-5:00 p.m.

Instructor: Sally Corwin-Osgood Date: June 30, 1993

Participant Progress

Curriculum based Pre and Post- Assessments were given to participants. All participants showed remarkable improvement in their pre and post results. Individual improvement ranged from 35 to 52 percentage points. The class average went from 44% on the pre- assessment to 89% on the post-assessment. This reflects the fact that 6 out of 7 post-assessed participants doubled their pre-assessment scores.

Evaluation Report

Course Expectations: Eighty-three percent of the participants stated that the course net their expectations. One-half of the participants thought they had the knowledge and skills necessary to take the course. Sixty-six percent of the participants rated the time allowed for the class as inadequate.

Course Content: When asked to rate the practical application of the course to their job, as well as helping to be more effective on the job, sixty-six percent of the participants responded positively. One hundred percent of the participants rated their overall impression of the course as high. Participants stated unanimously that the course objectives were clearly stated. Eighty-three percent agreed that the course met the stated objectives. Comments about the most useful information presented included:

- "Being reintroduced to the dictionary!"

Methods of Instruction: Eighty-three percent of the participants agreed that the exercises and practice of new skills and concepts was sufficient. The participants unanimously agreed that the text/readings were most helpful of the instructional materials. The Audio-visual aids and the computer based training was rated least helpful by fifty percent of the participants. Lecture and class discussion/questions and answers were rated as most used by one-hundred percent of the participants. Eighty-three percent rated the text, and exercises as used most. The video portion of the class was rated as least used by eighty-three percent of the class. Eighty-three percent of the participants also rated the materials as well organized. Comments included:

- " Company didn't allow enough time"

Instructor: One-hundred percent of the participants rated the instructor at the highest rating in: organization, preparation, subject mastery, making participants welcome and at ease, willingness to answer questions, and ability to communicate the subject matter. The participants unanimously agreed that they would take another course with this instructor. These overall high ratings in this area seemed to reflect the working cohesiveness and cooperation of this top-notch group of adult learners. Comments included:

- "very professional"
- "very helpful"
- "very knowledgeable,easy to listen to and well prepared"
- "The teacher knew the course and what she didn't know, she found out.."

Facilities: The participants unanimously rated the training room as inadequate. Comments included:

- " too cold!"
- " Room was either too hot or too cold"

TRW COMMUNICATIONS-ON-THE-JOB I
January 27 - April 6, 1993

EVALUATION SUMMARY

Instructor: Nancy Hoffstadt
Date: April 12, 1993

COURSE EXPECTATIONS:

100.0% agreed that the course content met their expectations.
76.9% agreed that they had the skills and knowledge necessary to take the course.
92.3% agreed that the amount of time allotted for the course was adequate.

COURSE CONTENT:

84.6% agreed that this course will help them do their job more effectively.
✓ 76.9% agreed that this course has practical application to their job.
✓ 84.6% rated their overall impression of this course above average.
100.0% agreed that the objectives of this course were clearly stated.
✓ 92.3% agreed that the course met the stated objectives.

Participant comments on the most useful information presented in this course are as follows:

- "All information in this course was helpful."
- "How to communicate with other employees"

METHODS OF INSTRUCTION:

✓ 100.0% agreed that there were sufficient exercises/practice with new skills and concepts.
✓ 100.0% rated the instructional materials (textbook/workbook, syllabus/outline, and audio-visual aids) most helpful.
✓ 100.0% rated the instructional methods/aids (text, lecture, exercises, discussions, Q & A, and videotapes) most helpful.
✓ 100.0% agreed that the materials were well organized.

Participant comments on the methods of instruction include the following:

- "Very good"
- "The materials were very helpful."
- "Well organized"
- "I recommend open-book testing."

TRW COMMUNICATIONS-ON-THE-JOB I
January 27 - April 6, 1993

EVALUATION SUMMARY

Instructor: Nancy Hoffstadt   Date: April 12, 1993

COURSE EXPECTATIONS:

100.0% agreed that the course content met their expectations.

76.9% agreed that they had the skills and knowledge necessary to take the course.

92.3% agreed that the amount of time allotted for the course was adequate.

COURSE CONTENT:

84.6% agreed that this course will help them do their job more effectively.

✓ 76.9% agreed that this course has practical application to their job.

✓ 84.6% rated their overall impression of this course above average.

100.0% agreed that the objectives of this course were clearly stated.

✓ 92.3% agreed that the course met the stated objectives.

Participant comments on the most useful information presented in this course are as follows:

* "All information in this course was helpful."
* "How to communicate with other employees"

METHODS OF INSTRUCTION:

✓ 100.0% agreed that there were sufficient exercises/practice with new skills and concepts.

✓ 100.0% rated the instructional materials (textbook/workbook, syllabus/outline, and audio-visual aids) most helpful.

✓ 100.0% rated the instructional methods/aids (text, lecture, exercises, discussions, Q & A, and videotapes) most helpful.

✓ 100.0% agreed that the materials were well organized.

Participant comments on the methods of instruction include the following:

* "Very good"
* "The materials were very helpful."
* "Well organized"
* "I recommend open-book testing."

INSTRUCTOR:

100.0% rated the instructor excellent on organization and preparation, mastery of subject matter, ability to make participants to feel welcomed and at ease, willingness to answer questions, and the ability to communicate the subject matter to the participants.

100.0% indicated they would take another course with this instructor.

Participant comments on the instructor include the following:

- "Wonderful teacher--very helpful and thoughtful"
- "Very good instructor"

FACILITIES:

61.5% rated the quality of the training room very good or excellent.

92.3% agreed that the necessary supplies were available to them.

Participant comments on the facilities include the following:

- "The room temperature was too hot/too cold."
- "Computer time was not available during work time."

INSTRUCTOR COMMENTS:

The Communications-on-the-Job I participants were a hard-working, motivated group of individuals. It was an enjoyable and refreshing experience for me to have worked with them throughout the ten-week period.

Attendance was outstanding. On rare occasions when a class member was absent, he or she would obtain class material upon return to class.

Pre-assessment scores ranged from a low of 3/50 = 6% to a high of 23/50 = 46%. Post-assessment scores ranged from a low of 13/50 = 26% to a high of 48/50 = 96%. All participants showed significant gains between their Pre-Assessment and Post-Assessment scores. The gains ranged from a low of 4 points to a high of 32 points, from a low of 10 percentage points to a high of 58 percentage points.

Room temperature ranged between very cool to extremely warm on any given day. The temperature controls available in the training room appeared to be inoperable. TRW management was notified.

Overall, I found the course to be a rewarding, educational experience--both for me and for the participants. The participants were challenged to think about, to analyze, and to demonstrate their knowledge and ability to communicate effectively.

ATTACHMENT G

RESULTS-ORIENTED WORKPLACE LITERACY

An Evaluation of the ROWL Project Undertaken
by the Unified Technologies Center
Cuyahoga Community College, Cleveland, Ohio

July 1, 1992 - October 31, 1993

FLW Associates
P.O. Box 91292
Cleveland, Ohio 44101-3292
216-333-8672

Submitted December 17, 1993

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"RESULTS-ORIENTED WORKPLACE LITERACY"

An Evaluation of the ROWL Project Undertaken by the Unified Technologies Center

Cuyahoga Community College, Cleveland, Ohio
July 1, 1992 - October 31, 1993

I. THE NATIONAL WORKPLACE LITERACY PROGRAM: Background

The National Workplace Literacy Program (NWLP), which funded this particular project, is administered by the U.S. Department of Education. Authorized by the Stafford-Hawkins School Improvement Act of 1988, the NWLP is designed to provide financial support to workplace literacy demonstration projects operated by partnerships of businesses, labor, and educational organizations. The Stafford-Hawkins Act is a Congressional response to concerns that an increasing percentage of the nation's labor force possessed insufficient basic skills and that this situation was adversely affecting productivity and U. S. competitiveness in the world marketplace.

The "Results-Oriented Workplace Literacy" (hereafter ROWL) project undertaken by the Unified Technologies Center of Cuyahoga Community College (hereafter "UTC") in 1992-93 is a direct response to the observed effectiveness of previously authorized programs (Pelavin Associates, 1991). Components associated with effective workplace literacy programs included:

1.) Active Involvement by Project Partners... in planning, designing and operating the NWLP Project.
2.) Active and Ongoing Involvement by Employees in conducting literacy task analyses and determining literacy levels.
3.) Systematic analyses of on-the-job literacy requirements.
4.) Developing instructional materials related to literacy skills required on the job.

(Pelavin Associates, p. v).

In addition, the FY '92 NWPL Solicitation required a formal evaluation plan that would be reviewed by the project participants. To ensure that the evaluation design conformed to both U.S. Department of Education regulations and to the expectations of the individual participants, an external contractor, FLW Associates (private specialists in instruction and technology) was retained to provide formal evaluation services (Appendix I).

The agreed-upon evaluation design was to address two major questions:

1.) Did the ROWL program improve workforce literacy?

2.) If so, did improved literacy lead to improved company productivity?

In addition, the evaluation design asked whether or not employees' morale improved over the course of the training period.

II. The UTC and its Workplace Training programs

Founded in 1986 as a partnership between Cuyahoga Community College and the Cleveland Advanced Manufacturing Program (C.A.M.P.), and sponsored by Cleveland Tomorrow, the UTC provides tailored education and training services to business and industry in support of increased quality, productivity and competitive advantage. Representative workplace literacy training programs engaged in by the UTC include long-term programs for the Ford Motor Company, the Ohio Bell Telephone Company (now known as Ameritech)and a host of small and medium-sized manufacturers in the greater Cleveland Area. The UTC was joined in this application by the Employers Resource Council, which provided liaison, team-building and dissemination supports.

III. THE PARTICIPATING COMPANIES: Common Characteristics

The three participating companies in the project -- Cleveland Wood Products, T.R.W., Inc. and Zircoa, Inc.--share several characteristics. As participants in the Great Lakes region manufacturing economy their managers agree that they commonly suffer, or face the potential of suffering, from a changing economy, global competition, and an aging, inadequately-trained workforce. They cite industry statistics indicating that a significant percentage of manufacturing employees would not be able to perform in more complex, technology-oriented environments. Few, if any, of the participating companies had conducted inventories of the basic literacy skills of their workforces, for a variety of reasons. Their shared perceptions, however, lead them to agree, with the UTC, on a common goal for the ROWL project:

> **"To increase employee-readiness for promotions, increase quantity and quality of work, improve job attitudes and job knowledge, and decrease error rates and reductions in waste, turnover, lost management time, and downtime through a results-oriented applied workplace basic skills enhancement program"** (Source: Application Narrative: UTC to the United States Dept. of Ed., November, 1991).

For more detail on the participating companies, refer to pages 10-15 of the preceding Final Report on the "UTC National Workplace Literacy Project(ROWL)".

IV. TRAINEES' JOBS:

A. Categories:

- **1.) Cleveland Wood Products:**
  - **-Machine Operator -Woodshop**
  - **-Bristling Operator**
  - **-Brush Assembler**

- **2.) Zircoa, Inc.**[1]
  - **-Oxygen Sensor Operator**
  - **-Machinist**

---

[1] Original specification: see Final Report changes.

- Fine Grain Batch Mixer

3.) TRW, Inc.
- Machinist
- Material Handler
- Inspector

B. Examples of Duties

-Machinist: Read and interpret SOP, transfer Quality Control information,apply computation & measurement skills to machine cutting, feeding, etc., understand process flow...

-Sensor Operator/Bristling Operator...: Understand/comprehend process flow, read blueprints (common to virtually all job categories), use Quality gauges, read orders...

-Inspector: Read/interpret electronic gauges, transfer quality control information, apply SPC techniques....

C. Company Problems, external indicators:

Cleveland Wood: Poor quality, scrap and rework, downtime, warranty returns, etc..

Zircoa, Inc.: Measurable scrap costs, rework costs, rework, on-time delivery --- often attributable to lack of sufficient entry level skills to accomplish assigned tasks.

TRW: Incorrect SOP interpretations leading to excessive defective parts, scrap; machine damage (and production delays and costly repairs resulting from); severe recall costs (lack of accurate quality information); improper movement of parts and wrong parts shipped, etc..

V. TRAINEES' DEMOGRAPHICS

There was a total of 388 subjects in the evaluation from whom at least some data were available. Complete data on all variables, however, were available from only about half this number. Attrition of subjects, mainly because of company layoffs, was high. Nonetheless, enough data are available for a meaningful analysis, except for the loss of the control group which was not to receive ROWL training.

The participants had these primary characteristics: most were white males between 21 and 40 years old, had high school diplomas or Grade Equivalent diplomas (GED's), spoke English as their primary language, and had an average of 10.8 years on the job. There were, however, significant numbers of women, minorities and workers of all ages. See Appendix II for details.

VI. DETAILS OF TRAINING PLAN.

Refer to the "Final Report on the UTC National Workplace Literacy Project (ROWL)", pps. 1-8, for details of the general process: the facilities utilized, the materials and the proposed and implemented methods.

VII. EVALUATION DESIGN.

See page 1 (above) for the broad goals of the Evaluation Plan. The process and timelines that were to be followed are described in Appendix III: The NWLP Evaluation Plan: "Results-Oriented Workplace Literacy". In terms of scope, FLW proposed to examine the following areas:

-Review of Training Products (curriculum/courseware) developed by the grant administrator and/or utilized in the self-paced, independent study laboratories. We proposed to utilize the training materials evaluation model employed by the Northwest Regional Educational Laboratory in collaboration with Conduit and MicroSIFT, supplemented by on-site visits to answer such questions as:

> Content: is the material accurate; does it have educational value; is it free of apparent cultural bias?
>
> Instructional Characteristics: Is the purpose of the educational package well-defined; does it achieve its defined purpose; is the scope/sequence clear, logical and at the appropriate level of difficulty...?
>
> Technical Characteristics: Are the user support materials comprehensive, effective? Can the learners easily and independently access and operate the support materials package?

-Effectiveness of trainers/methods: Using a structured questionnaire derived from the work of Macaulay, et. al. (1994), and adapted for use in a similar NWLP project in Worcester, MA., we proposed interviews with clients and their supervisors, supplemented by on-site observations, in order to ascertain measures of instructor and material effectiveness.

-Results achieved: The final report was to address two key areas of quantitative analysis:

1.) "Literacy" Gains: as measured by standardized achievement tests, administered in a pre- and posttest design. (see: "Instrumentation", below).

2.) "Productivity" Gains: as measured by the indicators posited by the three companies: e.g., amount of waste/scrap product; down time due to machine repair, et. al., returned parts/orders and negative customer feedback; unplanned absenteeism, et.al..

Further, FLW proposed to assess attitudinal gains as measured by the work Environment Scale (WES) as part of the overall pre- and posttest design, and to explore the linkage between achievement and productivity in an attempt to quantify overall changes in attitude for workers, supervisors, and management.

-Qualitative analysis: The above measures were to be complemented and/or validated by means of on-site visitations and structured interviews (**Appendix** VI), in an attempt to drive out, in a qualitative manner, some of the contributing causes and/or unanticipated consequences of observed changes due to the intervention program at any of the three sites.

-Overall Effectiveness of Training: Did trainers, productivity and clients change in the anticipated direction during the course of the intervention project? Was there observable change (and thus some measure of inferred causation) versus an identified control group bearing demographic similarity to the treatment group?

Disproving the Null Hypothesis: The null statistical hypothesis predicts no significant difference between pre- and posttest scores, beyond those attributable to chance. If the ROWL program were effective, however, the posttest scores would be significantly higher than the pretest scores. Accordingly, it was expected that participants in the ROWL training program would exhibit:

1.) A gain in general literacy, as indicated by pre- and posttest scores on the TABE and TALS.

2.)A larger gain in job-specific literacy tasks, as evidenced by pre- and post, criterion-referenced test scores (curriculum based).

3.) An improvement in (individual and collective) attitudes towards the workplace, as measured by the Work Environment Scale (below), and supplemented by non-scientific on-site interviews.

VIII. Instrumentation.

1.) Standardized tests. The attempt was made to administer the Test of Adult Basic Education (TABE) to all subjects, both before and after training, or, in the case of the control group, in the absence of training after an equivalent interval. A small sub-group was given the Test of Adult Literacy Skills (TALS) in order to validate it as an alternative measure of adult literacy, and an assessment of generic job-related skills. Details:

-**TEST OF ADULT BASIC EDUCATION (TABE)**, in "Survey" (shortened) form was administered to the general training population and used as a baseline for placing participants in the ROWL program (5 "tracks"); another version was also administered to all participants in the project at the end of the delivery phase in order to assess possible achievement gains.

-**TEST OF APPLIED LITERACY SKILLS (TALS)**: Taking seriously Sticht's (1990a) injunction that we should measure both content knowledge and "...the types of knowledge and skill that they possess regarding ...working with knowledge for doing something or learning something", FLW proposed the use of the ETS-derived TALS, to be administered to selected participants at the beginning and end of training delivery in order to pilot test it as a standardized instrument to be used as an alternative to the more academic TABE. As Bishop (1991) succinctly states: **"There is as yet no empirical evidence demonstrating that the literacy skills test scores are correlated with doing a better job in specific jobs..."** (see: preceding **Final Report**, p.4, and Bishop,J. "The Predictive Validity of the ETS Tests of Adult Literacy Skills, attached as **Appendix IV**).

2.) "Productivity" Gains: Indicators of waste, down-time, absenteeism, "quality" feedback from customers and supervisors, returned orders, etc. were to be provided by the companies, as stipulated in the Grant Proposal.

3.) "Attitude Change": The Work Environment Scale (WES) was to be used (pre- and post) to assess employee attitudes relative to the workplace.

4.) "Effectiveness" of Trainers, Curriculum, Methods: In observing trainer effectiveness, the aforementioned (Macaulay, et. al. -derived) Observation Checklist was utilized on-site by two trained observers; the NWREL/Conduit/MicroSIFT Courseware Evaluation form was used to evaluate the courseware utilized in the self-paced laboratories (Attachments I and II).

Comments on the validity/reliability of the above measures:

The TABE has well-established norms, validity, and reliability with a general population of adult basic education students; it is, however, somewhat academic in flavor and may not measure what it was purported to measure in terms of job-related skills, abilities and aptitudes.

The data provided by the publisher of the TALS (Educational Testing Services) indicates that it was normed with an adolescent/high school population, making its applicability to the adult population of the ROWL project somewhat questionable. ETS provides statistics supporting its reliability. According to Bishop (op.cit., p.2.), the TALS has both high face validity and high content validity, but it may not predict how well a person will function in a (new) job. The WES is the only workplace attitudinal assessment tool with established norms and reliability indicators. The Conduit/MicroSIFT Courseware Evaluation form has been in use since 1980 across a variety of school districts and college/JTPA populations. Since it is, by definition, somewhat subjective, its reliability has not been established.

IX. RESULTS

A. Pre- and Posttest Scores.

The following are the means and their differences between pre- and posttests on the standardized test scales. The asterisks indicate that the differences are statistically significant as determined by the t test, the standard statistical test of a non-chance difference between two means. The asterisked values below show that these differences did not occur by chance alone. They may or may not have occurred because of the effects of the training. See Appendix V for detailed statistics.

("*" means t test value was significant, $p < .05$)

TEST SCORE OR SCALE	PRE-	POST-	MEAN OF DIFF'S.
TEST OF ADULT BASIC EDUCATION (TABE)			
Reading standard score	764.66	767.42	+9.53
Reading percentage	73.08	75.94	+7.18 *
Reading stanine level	6.61	6.86	+0.58 *
Reading grade equiv.	9.76	9.88	+0.56 *
Math standard score	765.03	771.66	+12.42 *
Math percentage	66.71	70.01	+6.18 *
Math stanine level	6.19	6.54	+0.53 *
Math grade equiv.	8.63	9.09	+0.76 *
TEST OF APPLIED LITERACY SKILLS (TALS)			
TALS derivative score	279.06	286.00	+0.43 (n = 23)
TALS quantitative score	297.14	307.83	+3.48 (n = 23)

CRITERION (CLASS-BASED) TESTS

First class (%)	39.67	65.19	+24.69 *
Second class (%)	43.49	73.48	+29.45 *

WORK ENVIRONMENT SCALE (WES)

RAW SCORES	PRE-	POST-	MEAN OF DIFF'S	NORM
RELATIONSHIPS				
1. Involvement	3.57	3.79	+0.01	5.95
2. Peer cohesion	4.53	4.57	+0.04	5.70
3. Supervisor support	4.14	3.88	-0.23	5.68
PERSONAL GROWTH				
4. Autonomy	4.43	4.85	+0.33	5.54
5. Task orientation	4.56	4.89	+0.45	5.90
6. Work pressure	4.69	5.05	+0.58	4.40
SYSTEM MAINTENANCE AND CHANGE				
7. Clarity	3.79	3.62	-0.18	5.60
8. Control	4.87	3.62	-0.42	4.88
9. Innovation	3.39	4.01	+0.52	4.42
10. Physical comfort	2.28	2.34	-0.11	4.89

WORK ENVIRONMENT SCALE (WES)

SCALE SCORES	PRE-	POST-	MEAN OF DIFF'S.
RELATIONSHIPS			
1. Involvement	32.98	32.50	-2.10
2. Peer cohesion	39.84	38.00	-2.51
3. Supervisor support	39.07	35.78	-3.74
PERSONAL GROWTH			
4. Autonomy	41.00	42.27	+0.32
5. Task orientation	39.58	46.58	+7.86 *
6. Work pressure	52.00	46.19	-4.28 *
SYSTEM MAINTENANCE AND CHANGE			
7. Clarity	35.94	33.51	-2.75
8. Control	49.82	48.82	-0.80
9. Innovation	43.36	44.74	+0.63
10. Physical comfort	30.19	27.99	-1.76 *

PRODUCTIVITY

ZIRCOA MONTHLY AVERAGES DIFFERENCE	PRE- (7-9/92)	POST- (3-5/93)

1. Product complaints	11.33	13.67	+2.34
2. Absenteeism	0.7%	0.6%	-0.1%
3. Tardiness	0.4%	0.5%	+0.1%
4. Accidents	3.67	4.0	+0.33
5. "Speeds & selects" (scrap in $)	80M	72M	-8M

TRW MONTHLY AVERAGES	PRE- (10-12/92)	POST- (7-9/93)	DIFFERENCE
1. Product rejections 1-4/93	13960		
2. Product complaints 1-4/93	955		
3. Labor cost standard hr.	37.27	37.59	+0.32
4. Absenteeism	2.13%	2.5%	+0.37
5. Accidents			

CWP MONTHLY AVERAGES DIFFERENCE	PRE- (1-3/93)	POST- (7-10/93)	
1. Product scrap in $	14.5M	10.2M	-4.3M
2. Product returns	7.33	8.75	+1.42
3. Pieces per man hr.	7.59	7.87	+0.28
4. Absenteeism			
5. Accidents	3.33	1.00	-2.33

C. Attitude Survey

The following is a summary of results from an informal, non-scientific survey administered "on the floor" at two of the participating companies as a part of the formative (ongoing) evaluation. The survey, using an ad hoc, structured interview devised by FLW, gathered verbal data on the impact of the ROWL training program among participating workers and other personnel, including management. Its primary purpose was to capture information about the training program that may not have been solicited by the WES or by other formal, written evaluative materials. Because the respondents were not chosen at random, but merely at FLW's convenience during two site visits, the results cannot be viewed as indicative of all employees' attitudes toward the program. There was a total of 22 respondents.

1. Is following written instructions a requirement of your (your staff's) job?
Yes = 82%, No = 18%

2. Is calculating figures, say in using a formula, a requirement of your (your staff's) job?
Yes = 91%, No = 9%

3. Is precise measurement a job requirement?
Yes = 73%, No = 27%

4. When you started your job, could you easily follow written instructions?
Yes = 73%, No = 27%

5. When you started your job, could you easily perform the necessary calculations?
Yes = 86%, No = 32%

6. Are written instructions available for tasks necessary to perform the job?
Yes = 86%, No = 14%

7. Do you believe the training program will help people in it to improve their work skills?
Yes = 100%, No = 0%

8. Do you believe the program is the right length (of time)?
Yes - 55%, No = 5%, No opinion = 45%

9. In the long run, do believe the program will lead to greater company productivity?
Yes = 77%, No = 9%, No opinion = 14%

10. In the long run, do you believe the program will improve people's job satisfaction?
Yes = 68%, No = 18%, No opinion = 9%

11. In the long run, do you believe the program will encourage people to further their formal educations?
Yes = 59%, No = 32%, No opinion = 5%

D. Evaluation of Instruction

The following reflect observations made in conversations with ROWL management personnel on February 12, 1993 at the Unified Technologies Center and also on-site visits to Zircoa, Inc. on February 15, 1993, and TRW on 4/21/93, during which time classroom observations were undertaken and follow-up conversations with the course instructors and clients ensued.

SUMMARY COMMENTS FROM OBSERVERS:

I. ZIRCOA, INC. (RLW)

In general: the instructor appeared quite competent, was facile in engaging the class in "active" learning, used peer tutoring techniques to advantage and made herself available for individualized learning experiences as time allowed. She -- and Zircoa -- were the most committed of the 3 sites to the establishment and (relatively) smooth administration of a self-paced, individualized learning laboratory as a complement to (lecture/text) instruction. From a Direct Instruction, theoretical viewpoint, she provided, or attempted to provide, opportunities for drill-and-practice to "firm up" the students' grasp of the subject.

The intervention could've been improved by: 1.) a lengthier instructional cycle (a common theme in NWPL evaluations); 2.) more application exercises, discriminations and exercises in the printed material (related to #1, above); and (3), more self-paced workstations and more/better access to the Individualized Learning laboratory.

All-in-all, however, not a bad first pass at the project's stated goals and objectives. (**See Attachment I, for details**).

II. TRW (JF)

From this observer's viewpoint, the environment and delivery of workplace-related basic skills materials was nearly ideal at the TRW site. The class size was small (N=8) and the learners entered at about the same level. The room was quiet, tidy and comfortably arranged with tables and chairs. A competent teacher delivered a well-organized lesson that addressed previously determined goals appropriate for jobs held by the students. There was ample evidence that the students were learning basic arithmetic and were motivated to move through the levels as far as they could go during the time allowed.

On the other hand, there was little provision for self-paced learning, in which the learner could enter and leave the learning curve as his prior learning allowed and accelerate as quickly as his/her skills and available time permitted. (**See Attachment II, for details**).

E. Evaluation of Materials

The well-designed and seemingly adequate nature of the curricular materials has been commented upon above: these observations in mathematics apply to the Reading/Writing materials as well, since much the same process was used, and the clients (students)reported equal satisfaction with the latter. Due to time constraints, the materials were somewhat truncated and compact, however; which may've caused instructors and students at the lower end of the entering skills continuum some difficulties.

Utilizing the Courseware Evaluation form from NWREL/MicroSIFT, the evaluators offered observations on the (apparently popular) self-paced learning materials used in the individualized study laboratory (Zircoa, in particular), which is displayed here as **Attachment III.**

X. DISCUSSION AND RECOMMENDATIONS

The above data summary and Appendix V provide modest yet significant support of the efficacy of adult worker literacy training programs, both in general literacy and in specific job related literacy. Gains were evident in all areas measured by the TABE and TALS. Although the latter gains were not statistically significant because of the extremely small size of the TALS sub-sample, the absolute pre- to posttest differences suggest that such gains may have been significant with a larger TALS sub-group.

The modest gains in literacy, however,did not transfer to significant gains in worker morale as measured by WES. The one exception to this pattern was the Task Orientation Scale, which did show a significant increase. This variable, nonetheless, is very important in an industrial climate wherein worker safety and physical productivity are vital outcomes.

One caveat is absolutely essential to interpreting these results. Despite a strong effort by the UTC to enlist an independent control group that would have been administered the same pre- and posttest instruments as the participating workers (but without the training), unanticipated worker layoffs by a fourth company eliminated this group in the midst of the ROWL program. As a result, from a scientific perspective, a positive cause- and-effect inference about the effects of the ROWL training is not possible. It can be concluded, however, that the observed gains in literacy did not occur by chance alone. One can only speculate that the training program was the cause of the gains, ruling out other factors.

Some possible other factors that may explain the observed gains (or lack thereof) are, first, the simple exposure to a testing and classroom process which was probably absent from many workers' lives for many years. Initial anxieties about taking a battery of standardized tests, in particular the TABE and the criterion-based classroom tests, may have diminished as participants grew more comfortable with educational materials and small academically-oriented environments within their immediate workplaces.

Second, the fact that the WES scores of morale showed little or no gain (with one exception) might be explained by the current climate of the local economy in which recession and company layoffs have tended to maintain low morale among many, if not most, workers in a mature local manufacturing economy. The low morale was most clearly evident in comparing the mean participants' raw WES scores to national norms (based on a national sample of both blue and white collar workers).

The on-site observations of the program instructors and the instructional materials indicate that the quality of both was high. However, because of the different entry points of trainees into the curriculum, as determined by the TABE Survey test, and because of the "late bloomer" phenomenon, we recommend that future literacy training programs offer a greater quantity of easily-accessible, individualized, self-paced instructional materials, perhaps computerized multi-media programs. Such programs would enhance, but probably would not replace classroom instruction.

In conclusion, there appears to be substantial evidence that the ROWL program accomplished its goal of improving workplace literacy. The relationships among literacy, productivity, and morale, however, remain unclear. We recommend that these

relationships be studied over a much longer period, utilizing longitudinal measures of literacy, productivity, and morale.
Based on classroom observations, discussions with instructors and clients and upon inspection of the curricular materials, we recommend that a much longer training cycle (delivery of services) be utilized. Moreover, we recommend that future similar endeavors develop training programs that are more directed toward specific job skills. Specific job-related skill assessment is one of the goals of the TALS, which might be utilized more vigorously in future studies.

ATTACHMENTS (2): Teacher Evaluation Checklists

REFERENCES:

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Attachment I.(Zircoa)

WORKPLACE EDUCATION

Teacher Observation Checklist

I. THE INSTRUCTOR DEMONSTRATES AUTHENTICITY AND CREDIBILITY.

Indicators:

1.Demonstrates command of subject.

> Comments: Yes, but my general impression was that the instructor was inexperienced in presenting concepts in more than one fashion (i.e.; if not understood the first time, grasped for an alternative explanation). Discriminations between instances and non-instances of the concept were not introduced, no doubt due to time constraints.
>
> In general, the lack of sufficient time to cover the concepts for those being exposed to them for the first time will be a recurring theme in comments which follow.

2. Acknowledges students' knowledge and experience about the course content.

> Comments: Yes, the instructor did a good job with this (& see questions 6, 17).

3. Shows a willingness to admit errors in front of students.

> Comments: Yes, but not too applicable, here.

4. Shows a willingness to communicate feelings or to reveal the personal side of self, as appropriate.

> Comments: Yes.

5. Speaks in a clear, audible voice.

> Comments: Yes.

6. Uses appropriate vocabulary level and detail of explanation in class.

> Comments: Instructor sought to paraphrase the text, where

possible, and to relate its vocabulary to the job context. Instructor paraphrased the text when felt she was losing the class. In general, instructor preferred anecdotal, "real world" language to the formal language of mathematics -- which seemed quite appropriate.

7. **Provides assistance and/or positive reinforcement.**

Comments: Yes, about 60% of class time -- exclusive of breaks --was devoted to this effort, including the provision of positive reinforcement (i.e.; the instructor would circulate during class as students attempted to solve problems).

8. **Accommodates a variety of abilities in a multi-level class.**

Comments: This was difficult to do, given time constraints, the vagaries of the placement process (of which, more later). In general, the instructor was forced to target instruction towards the bottom 1/3 of the bell-shaped abilities curve. In this case, this was a cadre of 3-4 students to whom pre-algebra mathematics was a new learning experience, never before having encountered this material.

The instructor creatively involved those who only needed a refresher course (in order to quickly be reminded of the concepts) as tutors, in group learning situations, for the others. In cognitive psychological terms, these students had never truly forgotten algebraic and pre-algebraic concepts learned in high school: due to the passage of time, their retrieval capacities merely needed to be reactivated. Once this was accomplished, their "learning" curve was stupendous (they could've "tested out", had another course been available).

9. **Designs varied instructional format to accommodate multiple learning styles.**

Comments: The instructor worked hard to supplement the manual with explanations in class which varied the tone of the material, attempting to apply it to the real world. She supplemented the manual with many problems of her own derivation, for those students (and there were several) who needed more practice. Beyond lecture, there was small group work (see #8, above), and the provision of an opportunity to attend a self-paced lab offering CAI and CD-ROM (audio) materials for those who had not achieved total understanding during classroom and home-study sessions. The self-paced lab seemed to work best, in the instructor's observations, when: a.) a lab assistant was present to help orient the student; b.) the students visited the lab in pairs, which provided positive reinforcement and helped to overcome "Computer-Phobia."

The multimedia laboratory experience in mathematics (Ferranti courseware), in particular, provided a high degree of learner control (entry/exit with bookmark, self-paced, varied presentations of material). In addition, as with most quality multimedia software (this had been positively evaluated by national evaluation panels such as "Project Synergy"), there was an observed positive effect on learner motivation, due to the video examples and positive reinforcement provided. Sadly, however, there was only one workstation provided with this courseware and one hour per week with which to take advantage of it. Thus, the broad applicability of the mathematics portion of the self-paced laboratory was somewhat limited.

10. **Responds appropriately to student comments.**

Comments: Yes, but see comment #1. Instructor very good at providing heaping amounts of positive reinforcement.

11. **Uses appropriate questions -- open, closed, directed?**

Comments: Instructor alternated, first providing direct instruction of concepts ("closed"), then opening up and or directing the questions, once the concepts had been "learned". This seemed quite appropriate to the varied needs of the class and seemed to provide the appropriate structure.

12. **Distributes questions evenly among students.**

Comments: Yes, instructor drew out all members and controlled the "over-eagers." (There was one member who couldn't have been drawn out, regardless; but instructor attempted to catch up with him during problem-solving periods).

13. **Rephrases, redirects, defers questions.**

Comments: Yes; excellent at rephrasing questions in mathematical terms ("Where have we seen this before?"), and at deferring questions until appropriate (see #11).

14. **Manages transitions between learning objectives smoothly.**

Comments: Yes, aided by manual.

15. **Allows ample time for students to apply material presented.**

Comments: Within time constraints of class, tried to apply material to workplace environment. Some members of the class were quite good at this, and instructor utilized them well. In addition, the self-paced lab provided materials/problems in an applied context, for those who were able to avail themselves of its services.

16. **Uses appropriate illustrations, visuals, etc..**

Comments: Manual itself was quite visual and made good use of graphics -- which were mostly job-related ("Masters" of the various job classifications had been helpful in identifying and assembling these materials). Instructor supplemented with drawings/illustrations on blackboard.

17. **Relates new learning to prior learning.**

Comments: This was one place in which the instructor really shone. The manual itself was quite condensed, almost epigrammatic. Instructor superimposed a virtual "Spiral curriculum" over the printed materials, relating each new concept to material previously learned -- again, demonstrating her thorough knowledge of subject matter.

18. **Uses materials which are relevant to program goals.**

Comments: The manual itself dictated that this would be done. Instructor followed manual closely but was only able to cover 70% of the material due to the learning difficulties of the bottom 1/3 of the class (see #8, above).

19. **Encourages collaborative learning.**

Comments: Instructor made good use of collaborative learning, using accomplished students in group study situations (above) and sending students to the laboratory in pairs, where possible.

20. **Incorporates group projects or team presentations.**

Comments: Yes, in problem-solving sessions.

21. **Works jointly with students in decision-making processes.**

Comments: Apparently, this occurred in earlier classroom sessions pertaining to amount of material to be covered, utilization of self-paced lab -- not directly observed by this observer.

II. FEEDBACK AND EVALUATION.

Indicators:

22. **The instructor provides effective feedback and methods of**

evaluation.

Comments: Yes, utilized: 1.)Frequent quizzes (graded and passed out before the following class); 2.)Individual conferences with students upon request; 3.) Instructor presence in the self-paced lab 3' per week -- almost mandatory, as placement exam(s) for self-paced material would've been cumbersome for students to use without help; 4.) telephone calls to her home when students were having particular difficulties. The students, themselves, seemed highly motivated and took advantage of all these opportunities, it seemed to this observer.

23. Provides timely, individually affirming feedback to students.

Comments: This was difficult, if not close to impossible, given the time constraints of the class, the large amount of material to be covered. Instructor tried, during break time and laboratory time, to provide this typed of feedback where possible (and see: individual appointments, referred to above). In general, it seemed the instructor was highly motivated herself in this area, and went far beyond her job description in attempting to ensure success for these students.

If the program were being redesigned tomorrow, this area (including enhancement of the laboratory) would be a prime target for more resources, according to the instructor.

24. Solicits feedback regularly from students regarding his/her teaching style.

Comments: Somewhat, but not too applicable due to "direct instruction" approach, which seemed appropriate at this level (and see: Rosenshine, 1988)..

25. Creates sense that the learners are in control of their outcomes.

Comments: Somehow, perhaps early on, this seemed to have been accomplished, even for those at the bottom of the bell-shaped curve. These students put in a lot of outside class time on their own and seemed incredibly motivated to succeed.

Attachment II (TRW)

WORKPLACE EDUCATION

Teacher Observation Checklist

I. THE INSTRUCTOR DEMONSTRATES AUTHENTICITY AND CREDIBILITY.

Subject: Place values and simple division.

Indicators: The classroom was arranged quite nicely for students to see, hear and view a marker board at which the teacher illustrated all of her work. Table surfaces were ample and lighting was good. The curricular material was enclosed in binders, to which students added work exercises as they were covered. (N==8 students).

1.Demonstrates command of subject.

Comments: Ms. Hoffstadt's presentation of concepts was well-organized and clear. She had obviously planned a systematic way of getting her information across, point-by-point, thereby reflecting her considerable grasp of the content.

2. Acknowledges students' knowledge and experience about the course content.

Comments: Students raised questions spontaneously and they were fielded as they were raised. Frequency of questioning was not great, probably because of the clarity and the ease of the material. A certain formality (Direct Instruction) prevented discussions from getting off track at the expense of her instructional design.

3. Shows a willingness to admit errors in front of students.

Comments: Not observed.

4. Shows a willingness to communicate feelings or to reveal the personal side of self, as appropriate.

Comments: Ms. Hoffstadt attempted to set a warm, accepting atmosphere by relating comfortably to her students. Even her opening remarks were aimed at countering any lingering anxiety felt by adult learners.

5. Speaks in a clear, audible voice.

Comments: Her voice was clear and could be heard throughout the room. Her manner of address, although comfortable, was forceful so that the students paid attention.

6. Uses appropriate vocabulary level and detail of explanation in class.

Comments: Every effort was made to state things in a way that could be understood. Details, including repetition and restatement of previous points, were present, especially at the beginning of the lesson. Instructor paraphrased the text when felt she was losing the class.

7. Provides assistance and/or positive reinforcement.

Comments: Ms. Hoffstadt's manner was pleasant. She called students by their first names and interjected reinforcing comments into her answers, such as: "That's a good question; I'm glad you asked that."

8. Accommodates a variety of abilities in a multi-level class.

Comments: This was a group that placed very low on the arithmetic placement test. However, as the lesson progressed, certain of the students demonstrated greater command of the material, due to recall of the concepts from their youth. Ms. Hoffstadt tapped this set of "peer-tutor" resources in order to achieve understanding on the part of the rest of the group. Flexibility in reaching all levels was thereby demonstrated.

9. Designs varied instructional format to accommodate multiple learning styles.

Comments: Scores in arithmetic were examined before instruction began. Ms. Hoffstadt planned lessons for the very deficient students by arranging content that could be illustrated in job applications while making full use of the marker board to work calculations. Others in the group watched, but were more apt to complete a greater portion of the worksheet application after the presentation. This provided a sense of individualization for the better-skilled student. Their help came during the study periods.

10. Responds appropriately to student comments.

Comments: Yes.

11. Uses appropriate questions -- open, closed, directed?

Comments: Instructor asked easy questions, frequently -- a hallmark of successful direct instruction. Students gained a sense of pride in being able to respond, especially the more verbal students.

12. Distributes questions evenly among students.

Comments: A few students emerged as the "experts" on the subject matter.

13. Rephrases, redirects, defers questions.

Comments: Yes; questions from the students were used in the lesson as springboards for explanations.

14. Manages transitions between learning objectives smoothly.

Comments: The pace was appropriate, although repetition and pauses occurred less frequently, as she found it necessary to accelerate the lesson as the hour passed. There was ample time to deal with worksheets and study assignments, however.

15. Allows ample time for students to apply material presented.

Comments: Yes, covered in #14.

16. Uses appropriate illustrations, visuals, etc..

Comments: All arithmetic concepts and their calculations were illustrated on the marker board.

17. Relates new learning to prior learning.

Comments: I was very impressed with her attempts to build understandings based on what they brought to the class from their jobs. There was a clear use of bridges from job-related applications to classroom applications. The staff had done a good job at identifying the mathematics useful in the plant, even to the extent of job-by-job analyses.

18. Uses materials which are relevant to program goals.

Comments: A hierarchy of mathematics skills was worked out and compared to the mathematics demanded on the job. Observed on this occasion was the basic group and more than likely they will progress through the prescribed levels in subsequent training (and see: Final Report). Program goals were adhered-to in this fashion.

19. Encourages collaborative learning.

Comments: This material did not engender a good deal of collaborative learning.

20. **Incorporates group projects or team presentations.**

Comments: Not applicable.

21. **Works jointly with students in decision-making processes.**

Comments: Not applicable.

II. FEEDBACK AND EVALUATION.

22. **The instructor provides effective feedback and methods of evaluation.**

Comments: Worksheets distributed following the presentation were examined, as Ms. Hoffstadt circulated about the room. No exams were posed. She expressed a knowledge of how each of the eight students were doing and how she was building their skills from previous gains.

rowl.evl

APPENDICES

I. FLW Capabilities Statement

II. NWLP EVALUATION PLAN

III. Qualitative Analysis: Interview Questions

IV. Bishop,J., "The Predictive Validity of the ETS Tests of Adult Literacy Skills."

V. Productivity Indicators (By Company)

VI. a.) Observation Checklist
    b.) NWREL/CONDUIT/MICROSIFT Courseware Evaluation Guide.

FLWASSOCIATES "Instruction and Technology"

FLW Associates provides full-service consultant and software solutions to instructional problems faced by educators, trainers, and publishers. The firm is composed of specialists in adult instruction, instructional design, evaluation, measurement, computer programming, and computer-assisted instruction (CAI).

The principles:

James A. Frost, Ph.D., is a specialist in educational testing, measurement, and reading. For over thirty years, he has developed and supervised developmental skills programs for students of all ages. From 1966 to 1993, he taught a variety of psychology and education courses at Cuyahoga Community College in Cleveland, Ohio.

Kenneth B. LeSure, Ph.D., has taught general and developmental psychology at Cuyahoga Community College since 1984. With Dr. Frost, he has designed and developed a computerized self-paced curriculum in psychology.

Roger L. Williams, M.Ed. (specialty in instructional technology), was an editor, executive editor, and publisher in the college textbook industry for many years. Currently, he is Director of Learning Resources at Quinsigamond Community College in Worcester, Massachusetts. Recently, he was Director of Product Development at Systems Impact, a multimedia educational publisher, and Manager of Instructional Technologies at Cuyahoga Community College, which housed the first full-network Level III Interactive Videodisc (IVD) mathematics laboratory in the United States. He is an author or co-author of several Level III multimedia educational programs utilizing authoring languages such as SuperPilot, Quest, HyperCard, and Laserworks.

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LABEL:   NONE

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1 <= x < 2   69   69  22     22  |***********
2 <= x < 3  151  220 48.2   70.3 |************************
3 <= x < 4   93  313 29.7   100  |***************
4 <= x        0  313   0    100  |
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           ---- ---- ----- ----- -------------------------
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3 <= x < 4    2  312  0.6   98.1 |
4 <= x < 5    4  316  1.3   99.4 |
5 <= x < 6    2  318  0.6   100  |
6 <= x        0  318   0    100  |
    TOTAL   318      100

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1 <= x < 2   71   71 30.9   30.9 |***********
2 <= x < 3  159  230 69.1   100  |************************
3 <= x        0  230   0    100  |
    TOTAL   230      100

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           ---- ---- ----- ----- -------------------------
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0 <= x < 1    2    2  0.9    0.9 |*
1 <= x < 2   23   25  10    10.9 |*******
2 <= x < 3   66   91 28.7   39.6 |*********************
3 <= x < 4   74  165 32.2   71.7 |************************
4 <= x < 5   45  210 19.6   91.3 |***************
5 <= x < 6   20  230  8.7   100  |******
6 <= x        0  230   0    100  |
    TOTAL   230      100
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Age Dispersion Analysis

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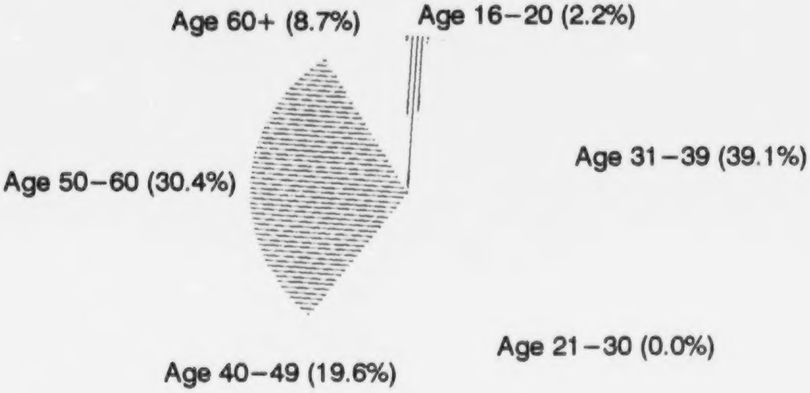
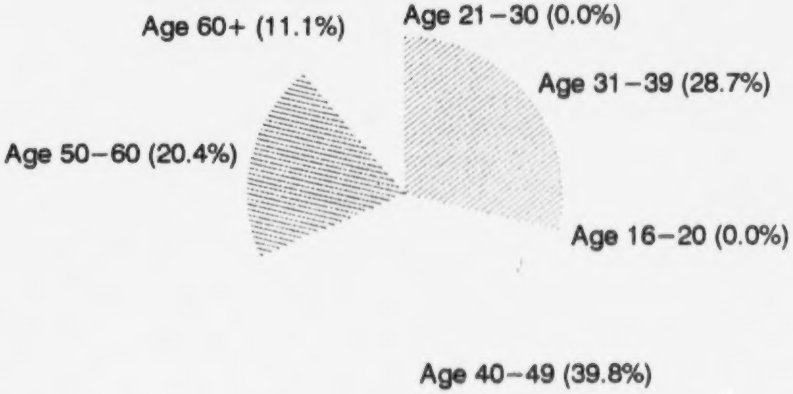
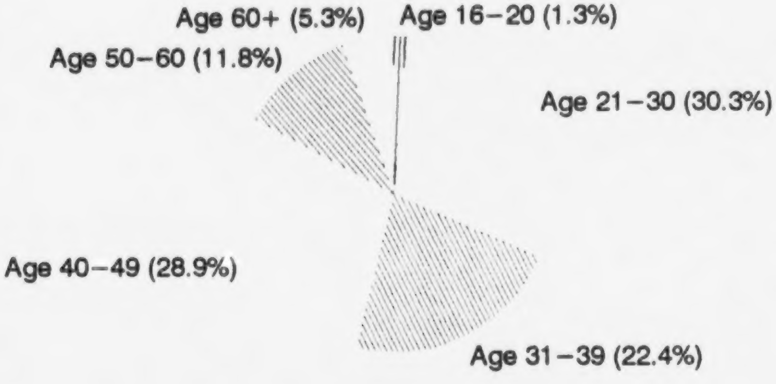


TRW Company

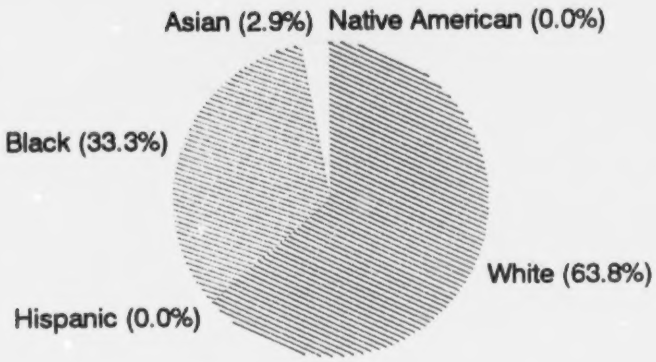


Cleveland Wood Products



Race Dispersion Analysis

Zircoa Company



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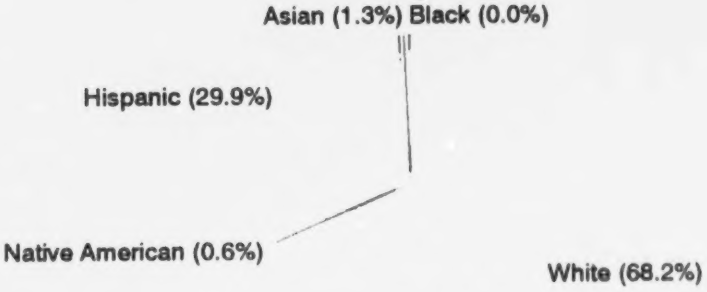

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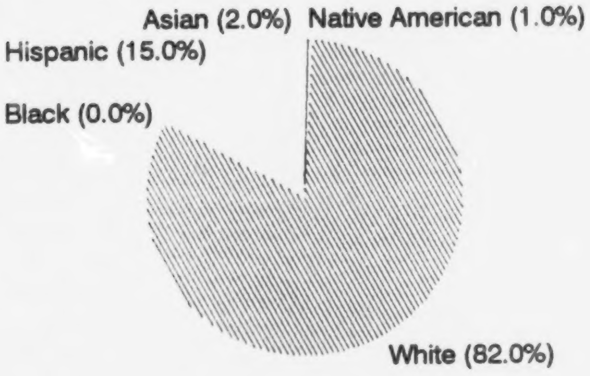
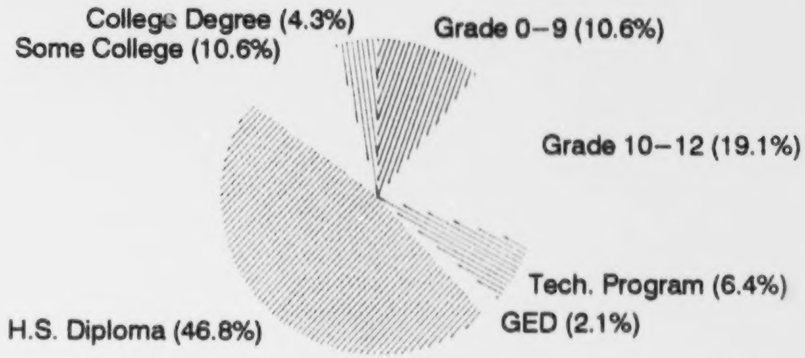
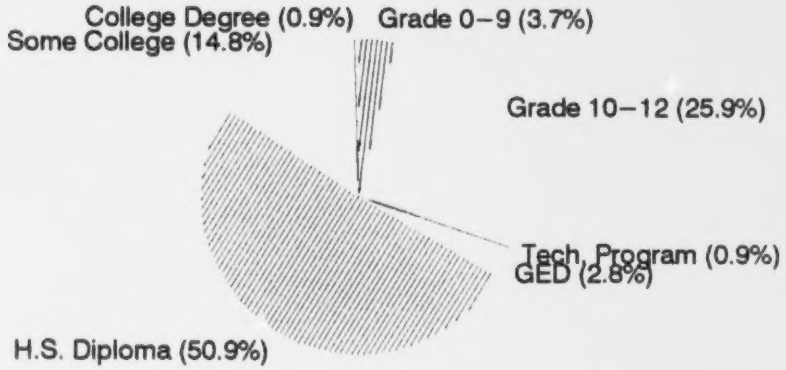


Education Level Analysis

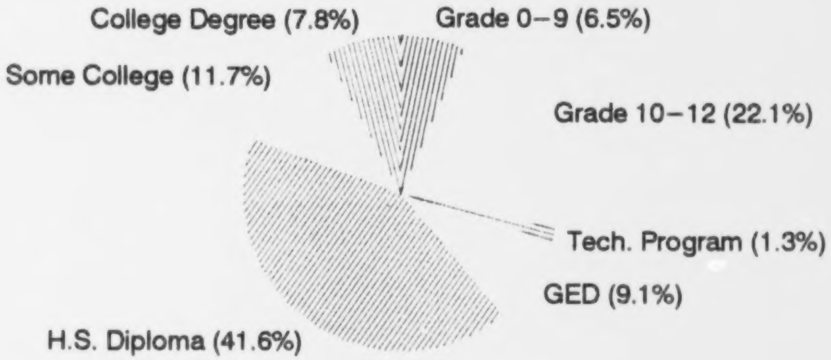
Zircoa Company



TRW Company

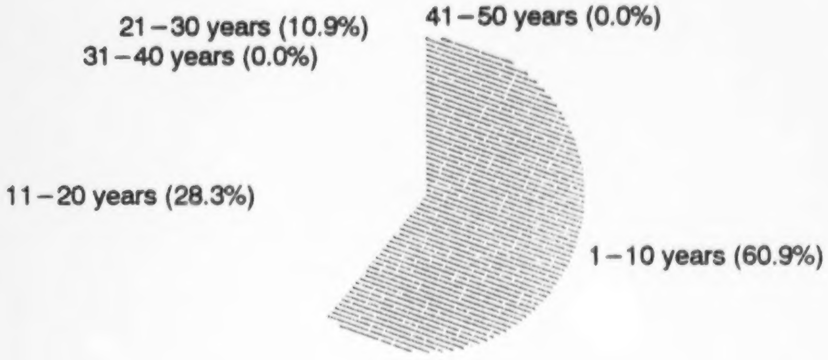


Cleveland Wood Products

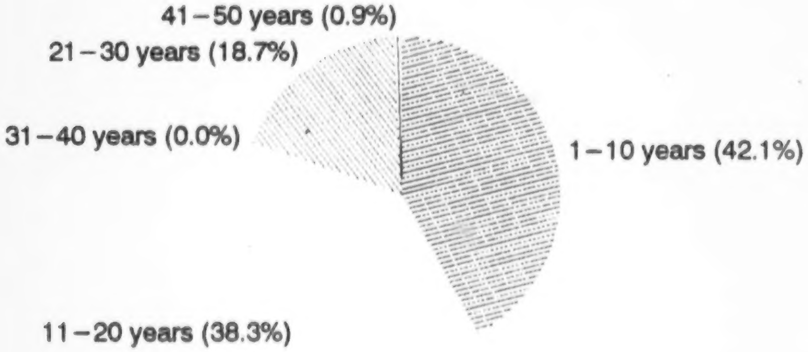


Years of Service Analysis

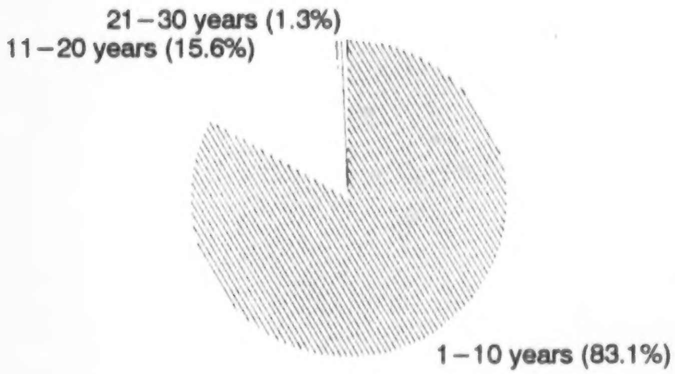
Zircoa Company



TRW Company



Cleveland Wood Products



IV

THE PREDICTIVE VALIDITY OF THE ETS TESTS OF ADULT LITERACY SKILLS

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Rationale

Many JTPA programs are evaluating the ETS Tests of Adult Literacy Skills (TALS) as a possible indicator of the success of their adult basic education training programs. Labor market outcomes, however, are the primary criterion for evaluating JTPA programs. It is known that people who score high on the literacy skills test tend to have better jobs, but there is as yet no * empirical evidence demonstrating that the literacy skills test scores are correlated with doing a better job in specific jobs. Proof that the skills assessed by the test do indeed make one a more productive worker would be of great benefit to JTPA training programs using the TALS. It would help program administrators evaluate the payoff to the adult basic skills training and aid in the marketing and placement of JTPA clients. Such research is also required before a derivative of the Adult Literacy Test could be considered for use for job referral purposes by training institutions and the Employment Service.

Proposed Study

There is a clear need for research on how well the ETS Tests of Adult Literacy Skills predict job outcomes such as supervisory assessments of performance, retention at the firm, promotions, and productivity. The best way to conduct such a study would be to administer the literacy scales to new hires (or possibly job candidates in the final round of consideration for an opening) and to job incumbents and then correlate the scores, a comparison test and some background information with indicators of success on the job. The indicators of job success would be retention and promotion over the course of the next six to twelve months, confidential supervisory assessments of job performance, and, if available, direct measures of productivity on the job. The study would focus on a limited number of populous entry level occupations. We propose a study which has samples of at least 250 workers per occupation (often from more than one corporation) and at least 2000 overall. We are flexible regarding which specific occupations would be studied.

We would score the test and code the questionnaire. Participants in the study would be assured that their test scores and responses would be kept totally confidential. Completing the tests and the associated questionnaire will require 3 hours, so a break for lunch or a snack will be essential. Participating firms would have the following responsibilities: (1) arranging for their workers to take the tests and complete the questionnaire, (2) providing information on retention, promotion and merit pay increases of sampled workers, (3) arranging for our staff to contact the supervisors of the sampled workers to obtain confidential supervisory ratings.

Company staff would administer the tests and questionnaires to new hires and send the completed forms in sealed envelopes to Cornell. For the job incumbents, we would arrange to have our staff visit the worksite to administer the test in groups of fifty or so. The confidential job performance assessments could be obtained either through the mail or during the visit.

CHARACTERISTICS OF THE STUDY

In general, the characteristics of the study will be as follows:

- Testing should be on company time, with the total time off the job not to exceed three hours. Voluntary testing (on the employee's own time) is generally not feasible and can seriously bias results.

- The actual test administrators could be Cornell and/or local personnel; this will be resolved on an individual company basis.

- The target population is locally sourced employees hired into typical entry level blue collar and white collar, unskilled and semi-skilled jobs, i.e., jobs for which the extent of basic literacy skills might be a relevant consideration. While the most desirable sites from our perspective will be companies with large numbers of employees on jobs within an occupational family, we want to make sure that clerical employees are included in the study.

- Evidence of validity will be developed from analysis of the relationship between test scores and indicators of performance. The performance measure typically will be a confidential rating by the employee's supervisor. The rating instrument is under development and will be viewed with the companies prior to implementation.

Form Available?

- Supervisory rating forms will be completed in group sessions conducted by researchers to ensure confidentiality and enhance understanding of the rating tolls and process. The rating process will likely require less than 10 minutes per employee evaluated, and the total time requirement will not exceed 2.5 hours. In the unusual case that there is more than one supervisor, we will need to review the situation to determine the best approach.

- We do not anticipate a need to review company records unless there is a situation where the employer has actual measures of individual employee output (objective productivity measures). In such cases, we would like to obtain both the ratings and the output measures.

- Actual field work could be conducted during the first quarter of 1992.

VII(6)

Northwest
Regional
Educational
Laboratory

microSIFT

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COURSEWARE EVALUATION PROCESS OVERVIEW

The process described here was designed during the 1980-81 school year as a framework for the evaluation of microcomputer-based instructional materials by the MicroSIFT clearinghouse. The components are a set of forms, the Evaluator's Guide, and a network of educational institutions.

The forms were based originally on the forms developed and used by the CONDUIT Project for evaluating computer-based instructional packages for post-secondary institutions. They were modified with additional concepts adopted from forms developed by the organizations and individuals. The "Courseware Description" form identifies the factual information necessary for evaluation and use of a package, including source, ability level, subject, mode of instruction, required hardware and software, instructional objectives and prerequisites. The "Courseware Evaluation" form is designed to be used after the information on the Description form is available. A copy of the rating portion is on the reverse of this page. In addition, it provides space for identifying major strengths and weaknesses, and suggestions for potential classroom uses.

The Evaluator's Guide is a book designed to be used by teachers and others who are evaluating courseware for MicroSIFT. It describes the use of the Description and Evaluation forms, and provides guidelines, suggestions and interpretations of each item on the Evaluation form.

The microSIFT Network is a group of over 20 educational organizations serving elementary and secondary schools with computer services and other types of support. The network includes school districts, regional service centers, state departments and state consortia which have experience in serving local districts with inservice, software, computer time and services, curriculum materials and evaluation services. They have staff whose time is assigned to supporting the instructional computing activities of schools in their geographic area.

The components above are used in the three stages of the process described below:

1. Sifting - This is a first look at a package to determine that it is instructional in nature, will actually operate without problems on the appropriate microcomputer, and is complete with instructions. MicroSIFT staff complete this phase of the process.
2. Description - A package passing stage 1 successfully is described in this stage using the Description form discussed above. The producer and MicroSIFT staff complete this stage for the most part. However, some information may be supplied in stage 3.
3. Peer Review - Teachers with experience in the subject and grade or ability level of the material are selected from schools served by a network site to evaluate packages according to the Evaluation form and Evaluator's Guide. A package is identified for a network site by MicroSIFT staff, and the teachers are selected by the instructional computing expert at the site. After the evaluations are completed by the teachers, an evaluation is also done by the network site expert, who also completes a summary review encompassing all three evaluations. The summary review becomes the MicroSIFT evaluation of the package.

Completion of the first three stages takes approximately three months. The resulting evaluations are professional opinions based on experience, and are not necessarily based on observation of student use of the packages. While some do include such use, the evaluators are volunteers, and their time does not always allow for extensive student involvement. Also, a package may be evaluated at a point in the school year not in conjunction with the time the topic is studied.

A fourth stage of evaluation in greater depth is desirable for some packages because of their complexity or breadth of curriculum coverage. Such a stage might include pre- and post-testing, detailed observation of student activity while using a package, or other procedures. This stage is not being implemented by MicroSIFT at this time, although some approaches for it are being developed and investigated.

BEST COPY AVAILABLE

microSIFT COURSEWARE EVALUATION

NORTHWEST REGIONAL
EDUCATIONAL LABORATORY

Package title ______________________________ Producer ______________________________

Evaluator name ______________________________ Organization ______________________________

Date ____________________ ☐ Check this box if this evaluation is based partly on your observation of student use of this package

SA - Strongly Agree A - Agree D - Disagree SD - Strongly Disagree NA - Not applicable
Please include comments on individual items on the reverse page.

CONTENT CHARACTERISTICS

(1)	SA A D SD	NA	The content is accurate.
(2)	SA A D SD	NA	The content has educational value.
(3)	SA A D SD	NA	The content is free of race, ethnic, sex and other stereotypes.

INSTRUCTIONAL CHARACTERISTICS

(4)	SA A D SD	NA	The purpose of the package is well defined.
(5)	SA A D SD	NA	The package achieves its defined purpose.
(6)	SA A D SD	NA	Presentation of content is clear and logical.
(7)	SA A D SD	NA	The level of difficulty is appropriate for the target audience.
(8)	SA A D SD	NA	Graphics/color/sound are used for appropriate instructional reasons.
(9)	SA A D SD	NA	Use of the package is motivational.
(10)	SA A D SD	NA	The package effectively stimulates student creativity.
(11)	SA A D SD	NA	Feedback on student responses is effectively employed.
(12)	SA A D SD	NA	The learner controls the rate and sequence of presentation and review.
(13)	SA A D SD	NA	Instruction is integrated with previous student experience.
(14)	SA A D SD	NA	Learning can be generalized to an appropriate range of situations.

TECHNICAL CHARACTERISTICS

(15)	SA A D SD	NA	The user support materials are comprehensive.
(16)	SA A D SD	NA	The user support materials are effective.
(17)	SA A D SD	NA	Information displays are effective.
(18)	SA A D SD	NA	Intended users can easily and independently operate the program.
(19)	SA A D SD	NA	Teachers can easily employ the package.
(20)	SA A D SD	NA	The program appropriately uses relevant computer capabilities.
(21)	SA A D SD	NA	The program is reliable in normal use.

QUALITY

Write a number from 1 (low) to 5 (high) which represents your judgement of the quality of the package in each division:

____ Content

____ Instructional Characteristics

____ Technical Characteristics

RECOMMENDATIONS

☐ I highly recommend this package.

☐ I would use or recommend use of this package with little or no change. (Note suggestions for effective use below.)

☐ I would use or recommend use of this package only if certain changes were made. (Note changes under weaknesses or other comments.)

☐ I would not use or recommend this package. (Note reasons under weaknesses.)

Describe the potential use of the package in classroom settings

Estimate the amount of time a student would need to work with the package in order to achieve the objectives:
(Can be total time, time per day, time range or other indicator.)

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Strengths:

Weaknesses:

Other comments:

microSIFT **COURSEWARE DESCRIPTION**

NORTHWEST REGIONAL EDUCATIONAL LABORATORY

Title ______________________________ Version Evaluated ______________

Producer ______________________________ Cost ______________

Subject/Topics ______________________________

Grade Level(s) (circle) pre-1 1 2 3 4 5 6 7 8 9 10 11 12 post-secondary

Required Hardware ______________________________

Required Software ______________________________

Software protected? ☐ yes ☐ no Medium of Transfer: ☐ Tape Cassette ☐ ROM Cartridge ☐ 5" Flexible Disk ☐ 8" Flexible Disk

Back Up Policy ______________________________

Producer's field test data is available ☐ on request ☐ with package ☐ not available

---

INSTRUCTIONAL PURPOSES & TECHNIQUES
please check all applicable

- ☐ Remediation
- ☐ Standard instruction
- ☐ Enrichment
- ☐ Assessment
- ☐ Instructional management
- ☐ Authoring
- ☐ Drill and practice
- ☐ Tutorial
- ☐ Information retrieval
- ☐ Game
- ☐ Simulation
- ☐ Problem Solving
- ☐ Other ______________

DOCUMENTATION AVAILABLE
circle P (program) S (supplementary material)

- P S Suggested grade/ability level(s)
- P S Instructional objectives
- P S Prerequisite skills or activities
- P S Sample program output
- P S Program operating instructions
- P S Pre-test
- P S Post-test
- P S Teacher's information
- P S Resource/reference information
- P S Student's instructions
- P S Student worksheets
- P S Textbook correlation
- P S Follow-up activities
- P S Other ______________

OBJECTIVES ☐ Stated ☐ Inferred

PREREQUISITES ☐ Stated ☐ Inferred

Describe package CONTENT AND STRUCTURE, including record keeping and reporting functions

use back for more space

WORKPLACE EDUCATION

Teacher Observation Checklist

I. THE INSTRUCTOR DEMONSTRATES AUTHENTICITY AND CREDIBILITY.

Indicators	Yes	N/O	Comments
Demonstrates command of subject			
Acknowledges students' knowledge and experience about the course content			
Shows a willingness to admit errors in front of students			
Shows a willingness to communicate feelings or to reveal the personal side of self, as appropriate			
Speaks in a clear, audible voice			
Uses appropriate vocabulary level and detail of explanation in class			
Provides assistance and/or positive reinforcement			
Accommodates a variety of abilities in a multi-level class			
Designs varied instructional format to accommodate multiple learning styles			
Responds appropriately to student comments			
Uses appropriate questions-open, closed, directed?			
Distributes questions evenly among students			
Rephrases, redirects, defers questions			

Instructional component, cont.

	Yes	N/O	Comments
Manages transitions between learning activities smoothly			
Allows ample time for students to apply material presented			
Uses appropriate illustrations, visuals, etc.			
Relates new learning to prior learning			
Uses materials which are relevant to program goals			
Encourages collaborative learning			
Incorporates group projects or team presentations			
Works jointly with students in decision-making processes			
II. FEEDBACK AND EVALUATION The instructor provides effective feedback and methods of evaluation			
Provides timely, individually affirming feedback to students			
Solicits feedback regularly from students regarding his teaching style			
Creates sense that the learners are in control of their outcomes			

III. COMMENTS

Employta.txt - Emp_Tabe

The data in employta.txt is the listing of the first and second round tabe scores. Some rows are complete, meaning that the individual has social security number, two sets of TABE scores and pre- and post- test scores that coincide with courses one and two in the classes.txt data. Some rows have * in the locator column indicating that the individual did not TABE and will only have pre- and post-test scores. Also the individuals from Elkem have not been re-TABE-ed yet. The abbreviations are as follows:

ssocial = social security number
frname = first name
lname = last name
r_locate = reading locator the individual tested from
(A, D, E, or M)
it is possible to have two different locators; one for reading and one for math
r_ss = reading standard score - first TABE
r_perc = reading percentage - first TABE
r_stan = reading stanine level - first TABE
r_ge = reading grade equivalent - first TABE
m_locate = math locator the individual tested from
m_ss = math standard score - first TABE
m_perc = math percentage - first TABE
m_stan = math stanine level - first TABE
m_ge = math grade equivalent - first TABE
TALS D = TALS Derivitive Score - first round
TALS Q = TALS Quantitative Score - first round
TALS D2 = TALS Derivitive Score - second round
TALS Q2 = TALS Quantitative Score - second round
company = company individual works for
r_ss_2 = reading standard score - Re-TABE
r_perc_2 = reading percentage - Re-TABE
r_stan_2 = reading stanine level - Re-TABE
r_ge_2 = reading grade equivalent - Re-TABE
m_ss_2 = math standard score - Re-TABE
m_perc_2 = math percentage - Re-TABE
m_stan_2 = math stanine level - Re-TABE
m_ge_2 = math grade equivalent - Re-TABE
pre_t1 = pre-test score for the first class in percent form
post_t1 = post-test score for the first class in percent form
pre_t2 = pre-test score for the second class in percent form
post_t2 = post-test score for the second class in percent form
comp_1 = difference between pre and post test 1 (for most individuals
comp_2 = difference between pre and post test 2 this is incomplete)

Wesscores.txt - Wes

The wesscores.txt contains data from the wes table. The hard copy is sorted by company and then ascending social security numbers within the company. It is possible for an individual to have only one set of scores. An individual who has not taken one of the rounds of WES testing will have N/As in the columns. The abbreviations are as follows:

company = company individual works for
social = social security number
i_r = involvement - raw score
pc_r = peer cohesion - raw score
ss_r = supervisor support - raw score
a_r = autonomy - raw score
to_r = task orientation - raw score
wp_r = work pressure - raw score
c_r = clarity - raw score
ctl_r = control - raw score
inn_r = innovation - raw score
com_r = physical comfort - raw score
i_s = involvement - scale score
pc_s = peer cohesion - scale score
ss_s = supervisor support - scale score
a_s = autonomy - scale score
to_s = task orientation - scale score
wp_s = work pressure - scale score
c_s = clarity - scale score
ctl_s = control - scale score
inn_s = innovation - scale score
com_s = physical comfort - scale score

The following abbrevations with _r2 and _s2 are for the second round of scores. The abbreviations beyond those that end with _c and _cs were set up for composite scores but never used.

```
LISTING OF ASP FILES IN C:\ASP\NWLP\
     NWLPDATA
```

```
 FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 388
LABEL: NONE
    VARIABLE NAMES:
  1. ssnumber     2. company      3. race         4. veteran      5. us_cit
  6. sex          7. age          8. education    9. language    10. yrsonjob
 11. r_locate    12. r_ss        13. r_perc      14. r_stan      15. r_ge
 16. m_locate    17. m_ss        18. m_perc      19. m_stan      20. m_ge
 21. tals_d      22. tals_q      23. tals_d2     24. tals_q2     25. r_ss2
 26. r_perc2     27. r_stan2     28. r_ge2       29. m_ss2       30. m_perc2
 31. m_stan2     32. m_ge2       33. pre_t1      34. post_t1     35. pre_t2
 36. post_t2     37. comp_1      38. comp_2      39. i_r         40. pc_r
 41. ss_r        42. a_r         43. to_r        44. wp_r        45. c_r
 46. ctl_r       47. inn_r       48. com_r       49. i_s         50. pc_s
 51. ss_s        52. a_s         53. to_s        54. wp_s        55. c_s
 56. ctl_s       57. inn_s       58. com_s       59. i_r2        60. pc_r2
 61. ss_r2       62. a_r2        63. to_r2       64. wp_r2       65. c_r2
 66. ctl_r2      67. inn_r2      68. com_r2      69. i_s2        70. pc_s2
 71. ss_s2       72. a_s2        73. to_s2       74. wp_s2       75. c_s2
 76. ctl_s2      77. inn_s2      78. com_s2
```

```
 FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 0)
LABEL:    NONE
```

```
                                SUMMARY STATISTICS

                             ssnumber     company          race     veteran
                           ---------- ------------ ----------- -----------
                    Mean = 2.85298E8     2.07668      1.33333     0.984375
                 Maximum = 5.87106E8     3            5           1
                 Minimum = 0.00000E0     1            1           0
                   Range = 5.87106E8     2            4           1
      Valid Observations = 3.20000E2  313           318          64
          Missing Values = 0.00000E0     7            2         256
    Sample Standard Dev. = 6.64818E7     0.716472     0.622062    0.125
         Sample Variance = 4.41983E15    0.513333     0.386961    0.015625
    Sample Coef. Of Var. = 2.33026E-1    0.345009     0.466546    0.126984
  Standard Error Of Mean = 3.71645E6     0.0404974    0.0348835   0.015625
                  Median = 2.84324E8     2            1           1
          First Quartile = 2.73558E8     2            1           1
          Third Quartile = 2.95657E8     3            2           1
     Interquartile Range = 2.20983E7     1            1           0
    Lower Adjacent Value = 2.44781E8     1          *********** ***********
    Upper Adjacent Value = 3.03527E8  ************    3         ***********
          Minor Outliers = 2.20000E1     0            6           0
          Major Outliers = 4.90000E1     0            0           1
      Standard Deviation = 6.63779E7     0.715327     0.621083    0.12402
                Variance = 4.40602E15    0.511692     0.385744    0.0153809
     Coefficient Of Var. = 2.32662E-1    0.344457     0.465812    0.125988
                     Sum = 9.12953E10 650           424          63
          Sum Of Squares = 2.74563E19 1510          688          63
     Sum Of Squared Dev. = 1.40993E18  160.16       122.667       0.984375
           Second Moment = 4.40602E15    0.511692     0.385744    0.0153809
            Third Moment = 1.20194E23   -0.0414791    0.627533   -0.0149002
           Fourth Moment = 2.15135E32    0.512209     1.8812      0.0146711
 Coefficient Of Skewness = 4.10974E-1   -0.113322     2.61931    -7.81127
 Coefficient Of Kurtosis = 1.10820E1     1.95627     12.6426     62.0159
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 0)
ABEL:    NONE

                                     SUMMARY STATISTICS

                                    sex          age   education    language
                            ----------- ------------ ----------- -----------
                    Mean =   1.6913       2.85652      3.17316    1.0524
                 Maximum =   2            5            6          2
                 Minimum =   1            0            0          1
                   Range =   1            5            6          1
      Valid Observations = 230          230          231        229
          Missing Values =  90           90           89         91
    Sample Standard Dev. =   0.462963     1.13742      1.6799     0.223324
         Sample Variance =   0.214335     1.29373      2.82206    0.0498736
    Sample Coef. Of Var. =   0.273731     0.398185     0.529409   0.212204
  Standard Error Of Mean =   0.0305269    0.0749996    0.110529   0.0147577
                  Median =   2            3            4          1
          First Quartile =   1            2            1          1
          Third Quartile =   2            4            4          1
     Interquartile Range =   1            2            3          0
    Lower Adjacent Value = ***********    0            0          ***********
    Upper Adjacent Value = ***********    5            6          ***********
          Minor Outliers =   0            0            0          0
          Major Outliers =   0            0            0         12
      Standard Deviation =   0.461955     1.13495      1.67626    0.222836
                Variance =   0.213403     1.28811      2.80984    0.0496558
     Coefficient Of Var. =   0.273135     0.397319     0.528262   0.21174
                     Sum = 389          657          733        241
          Sum Of Squares = 707         2173         2975        265
     Sum Of Squared Dev. =  49.0826     296.265      649.074     11.3712
           Second Moment =   0.213403     1.28811      2.80984    0.0496558
            Third Moment =  -0.0816497    0.126966    -2.43455    0.0444517
           Fourth Moment =   0.0767806    4.0916      15.5522     0.0422587
Coefficient Of Skewness =  -0.828238     0.0868477   -0.516887   4.01729
Coefficient Of Kurtosis =   1.68598      2.46597      1.96982   17.1386
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 0)
LABEL:    NONE

                                  SUMMARY STATISTICS

                             yrsonjob     r_locate           r_ss        r-perc
                           ------------ ------------ ----------- -----------
                   Mean =    10.9083      2.58654     7.64661E2   7.30789E1
                Maximum =    42           4           8.44000E2   9.90000E1
                Minimum =    0            0           4.13000E2   1.00000E0
                  Range =    42           4           4.31000E2   9.80000E1
     Valid Observations =   229         312           3.04000E2   3.04000E2
         Missing Values =    91           8           1.60000E1   1.60000E1
   Sample Standard Dev. =     7.65228     1.34865     5.78096E1   2.73030E1
        Sample Variance =    58.5573      1.81885     3.34195E3   7.45452E2
   Sample Coef. Of Var. =     0.70151     0.521411    7.56016E-2  3.73609E-1
 Standard Error Of Mean =     0.505677    0.0763522   3.31561E0   1.56593E0
                 Median =    9            2.5       . 7.77000E2   8.30000E1
         First Quartile =    5            1           7.50000E2   5.90000E1
         Third Quartile =    15           4           8.02000E2   9.50000E1
    Interquartile Range =    10           3           5.20000E1   3.60000E1
   Lower Adjacent Value =    0            0           6.77000E2   5.00000E0
   Upper Adjacent Value =    29        ************   8.44000E2   9.90000E1
         Minor Outliers =    1            0           1.50000E1   8.00000E0
         Major Outliers =    0            0           6.00000E0   0.00000E0
     Standard Deviation =     7.63555     1.34649     5.77144E1   2.72580E1
               Variance =    58.3016      1.81302     3.33095E3   7.43000E2
      Coefficient Of Var. =   0.699976    0.520574    7.54771E-2  3.72994E-1
                    Sum =  2498         807           2.32457E5   2.22160E4
         Sum Of Squares = 40600         2653          1.78763E8   1.84939E6
    Sum Of Squared Dev. = 13351.1        565.663      1.01261E6   2.25872E5
          Second Moment =    58.3016      1.81302     3.33095E3   7.43000E2
           Third Moment =   402.359      -0.478549   -4.60204E5  -2.29294E4
          Fourth Moment = 11576           4.84214     1.24720E8   1.77305E6
Coefficient Of Skewness =     0.903842   -0.196029   -2.39385E0  -1.13217E0
Coefficient Of Kurtosis =     3.40563     1.47309     1.12409E1   3.21177E0
```

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```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 0)
LABEL:    NONE

                         SUMMARY STATISTICS

                              r_stan          r_ge      m_locate         m_ss
                        ------------ ------------ ------------ -----------
                 Mean =      6.60726       9.75987     2.79553    7.65026E2
              Maximum =      9            13           4          8.61000E2
              Minimum =      1             2           0          4.66000E2
                Range =      8            11           4          3.95000E2
   Valid Observations =    303           304         313          3.04000E2
       Missing Values =     17            16           7          1.60000E1
  Sample Standard Dev. =     2.03469       3.08273     1.29955    5.27453E1
      Sample Variance =      4.13995       9.5032      1.68883    2.78207E3
  Sample Coef. Of Var. =     0.307947      0.315857    0.464867   6.89457E-2
Standard Error Of Mean =     0.11689       0.176806    0.0734548  3.02515E0
               Median =      7            11           3          7.70000E2
       First Quartile =      5             8           2          7.44500E2
       Third Quartile =      8            12.5         4          7.95500E2
  Interquartile Range =      3             4.5         2          5.10000E1
 Lower Adjacent Value =      1             2           0          6.71000E2
 Upper Adjacent Value =      9            13        ************ 8.61000E2
       Minor Outliers =      0             0           0          8.00000E0
       Major Outliers =      0             0           0          4.00000E0
   Standard Deviation =      2.03133       3.07765     1.29747    5.26585E1
             Variance =      4.12628       9.47194     1.68343    2.77291E3
    Coefficient Of Var. =    0.307438      0.315337    0.464124   6.88322E-2
                  Sum =   2002          2967         875          2.32568E5
       Sum Of Squares = 14478          31837        2973          1.78764E8
    Sum Of Squared Dev. =  1250.26      2879.47      526.914      8.42966E5
        Second Moment =      4.12628       9.47194     1.68343    2.77291E3
         Third Moment =     -7.11406     -26.6199     -1.06104   -2.71658E5
        Fourth Moment =     53.1829      260.272       4.919      8.06226E7
Coefficient Of Skewness =   -0.848749     -0.91316    -0.485779  -1.86045E0
Coefficient Of Kurtosis =    3.12359       2.90101     1.73575    1.04854E1
```

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```
 FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 0)
LABEL:    NONE

                               SUMMARY STATISTICS
                               m_perc       m_stan         m_ge       tals_d
                          ----------- ------------ ------------ -----------
                   Mean =  6.67105E1      6.18812      8.62928   2.86000E2
                Maximum =  9.90000E1      9           12.9       3.50000E2
                Minimum =  1.00000E0      1            1.4       2.00000E2
                  Range =  9.80000E1      8           11.5       1.50000E2
     Valid Observations =  3.04000E2    303          304         3.50000E1
         Missing Values =  1.60000E1     17           16         2.85000E2
   Sample Standard Dev. =  2.83948E1      2.05574      2.76967   4.36699E1
        Sample Variance =  8.06266E2      4.22608      7.67105   1.90706E3
   Sample Coef. Of Var. =  4.25642E-1     0.332208     0.320962  1.52692E-1
 Standard Error Of Mean =  1.62855E0      0.118099     0.158851  7.38156E0
                 Median =  7.50000E1      6            8.4       2.90000E2
         First Quartile =  4.60000E1      5            6.8       2.60000E2
         Third Quartile =  9.20000E1      8           10.9       3.20000E2
    Interquartile Range =  4.60000E1      3            4.1       6.00000E1
    Lower Adjacent Value =  1.00000E0      1            1.4       2.00000E2
    Upper Adjacent Value =  9.90000E1      9           12.9       3.50000E2
         Minor Outliers =  0.00000E0      0            0         0.00000E0
         Major Outliers =  0.00000E0      0            0         0.00000E0
     Standard Deviation =  2.83481E1      2.05235      2.76511   4.30415E1
               Variance =  8.03614E2      4.21214      7.64582   1.85257E3
     Coefficient Of Var. =  4.24942E-1     0.33166      0.320433  1.50495E-1
                    Sum =  2.02800E4   1875         2623.3       1.00100E4
         Sum Of Squares =  1.59719E6  12879        24961.5       2.92770E6
     Sum Of Squared Dev. =  2.44299E5   1276.28      2324.33     6.48400E4
          Second Moment =  8.03614E2      4.21214      7.64582   1.85257E3
           Third Moment = -1.55652E4     -3.66103     -2.82488  -1.68480E4
          Fourth Moment =  1.47126E6     44.4434     140.563     7.06261E6
Coefficient Of Skewness = -6.83256E-1    -0.423497    -0.133618 -2.11293E-1
Coefficient Of Kurtosis =  2.27821E0      2.50497      2.40448   2.05786E0
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 0)
ABEL:    NONE
```

```
                                   SUMMARY STATISTICS

                                tals_q      tals_d2      tals_q2        r_ss2
                              ----------- ----------- ----------- -----------
                     Mean =  2.97143E2   2.97826E2   3.07826E2   7.67418E2
                  Maximum =  3.70000E2   3.70000E2   3.80000E2   8.44000E2
                  Minimum =  2.00000E2   1.90000E2   1.80000E2   0.00000E0
                    Range =  1.70000E2   1.80000E2   2.00000E2   8.44000E2
       Valid Observations =  3.50000E1   2.30000E1   2.30000E1   1.65000E2
           Missing Values =  2.85000E2   2.97000E2   2.97000E2   1.55000E2
     Sample Standard Dev. =  4.31530E1   3.72896E1   4.79542E1   7.67233E1
          Sample Variance =  1.86218E3   1.39051E3   2.29960E3   5.88646E3
     Sample Coef. Of Var. =  1.45227E-1  1.25206E-1  1.55783E-1  9.99759E-2
   Standard Error Of Mean =  7.29420E0   7.77542E0   9.99914E0   5.97290E0
                   Median =  3.00000E2   3.00000E2   3.10000E2   7.83000E2
           First Quartile =  2.65000E2   2.80000E2   2.80000E2   7.54000E2
           Third Quartile =  3.35000E2   3.30000E2   3.35000E2   8.02000E2
      Interquartile Range =  7.00000E1   5.00000E1   5.50000E1   4.80000E1
     Lower Adjacent Value =  2.00000E2   2.50000E2   2.10000E2   6.91000E2
     Upper Adjacent Value =  3.70000E2   3.70000E2   3.80000E2   8.44000E2
           Minor Outliers =  0.00000E0   1.00000E0   1.00000E0   8.00000E0
           Major Outliers =  0.00000E0   0.00000E0   0.00000E0   3.00000E0
       Standard Deviation =  4.25321E1   3.64699E1   4.69001E1   7.64904E1
                 Variance =  1.80898E3   1.33006E3   2.19962E3   5.85079E3
      Coefficient Of Var. =  1.43137E-1  1.22454E-1  1.52359E-1  9.96724E-2
                      Sum =  1.04000E4   6.85000E3   7.08000E3   1.26624E5
           Sum Of Squares =  3.15360E6   2.07070E6   2.23000E6   9.81389E7
      Sum Of Squared Dev. =  6.33143E4   3.05913E4   5.05913E4   9.65380E5
            Second Moment =  1.80898E3   1.33006E3   2.19962E3   5.85079E3
             Third Moment = -2.70997E4  -3.71850E4  -8.47313E4  -2.89864E6
            Fourth Moment =  8.32391E6   7.81239E6   1.89082E7   2.14002E9
  Coefficient Of Skewness = -3.52220E-1 -7.66589E-1 -8.21338E-1 -6.47699E0
  Coefficient Of Kurtosis =  2.54366E0   4.41615E0   3.90800E0   6.25158E1
```

```
 FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 0)
 LABEL:    NONE

                                   SUMMARY STATISTICS

                               r_perc2      r_stan2        r_ge2         m_ss2
                             ----------- ----------- ------------ -----------
                    Mean =  7.59363E1     6.8589        9.87866     7.71655E2
                 Maximum =  9.90000E1     9               12.9      8.63000E2
                 Minimum =  1.00000E0     1                1.9      4.66000E2
                   Range =  9.80000E1     8               11        3.97000E2
      Valid Observations =  1.57000E2   163              164        1.68000E2
          Missing Values =  1.63000E2   157              156        1.52000E2
    Sample Standard Dev. =  2.59362E1     1.83544       2.80238     5.07198E1
         Sample Variance =  6.72688E2     3.36886       7.85335     2.57250E3
    Sample Coef. Of Var. =  3.41552E-1    0.267601      0.28368     6.57287E-2
  Standard Error Of Mean =  2.06994E0     0.143763      0.218829    3.91312E0
                  Median =  8.70000E1     7               10.9      7.76000E2
          First Quartile =  6.10000E1     6                8.2      7.47000E2
          Third Quartile =  9.50000E1     8               11.9      8.03000E2
     Interquartile Range =  3.40000E1     2                3.7      5.60000E1
      Lower Adjacent Value =  1.30000E1   3                2.8      6.70000E2
    Upper Adjacent Value =  9.90000E1     9               12.9      8.63000E2
          Minor Outliers =  3.00000E0     2                2        2.00000E0
          Major Outliers =  0.00000E0     0                0        2.00000E0
      Standard Deviation =  2.58535E1     1.82981       2.79383     5.05687E1
                Variance =  6.68404E2     3.34819       7.80546     2.55719E3
     Coefficient Of Var. =  3.40463E-1    0.266778      0.282814    6.55328E-2
                     Sum =  1.19220E4  1118           1620.1        1.29638E5
          Sum Of Squares =  1.01025E6  8214          17284.5        1.00465E8
     Sum Of Squared Dev. =  1.04939E5   545.755       1280.1        4.29608E5
           Second Moment =  6.68404E2     3.34819       7.80546     2.55719E3
            Third Moment = -2.11033E4    -4.57372     -21.5352     -2.37183E5
           Fourth Moment =  1.51116E6    34.0304      192.381       7.26263E7
 Coefficient Of Skewness = -1.22121E0    -0.746544     -0.987532   -1.83417E0
 Coefficient Of Kurtosis =  3.38246E0     3.03562       3.15766     1.11063E1
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 0)
  BEL:    NONE

                                SUMMARY STATISTICS

                                  m_perc2      m_stan2        m_ge2          pre_t1
                              ----------- ----------- ----------- -------------
                     Mean =  6.99688E1     6.54167        9.08929       39.6651
                  Maximum =  9.90000E1     9             13             86
                  Minimum =  1.00000E0     1              1              0
                    Range =  9.80000E1     8             12             86
       Valid Observations =  1.60000E2   168            168            215
           Missing Values =  1.60000E2   152            152            105
    Sample Standard Dev. =  2.82997E1     1.99956        2.84496       20.4594
         Sample Variance =  8.00873E2     3.99825        8.09378      418.588
    Sample Coef. Of Var. =  4.04462E-1    0.305666       0.313001       0.515804
  Standard Error Of Mean =  2.23729E0     0.15427        0.219493       1.39532
                  Median =  7.95000E1     7              9             40
          First Quartile =  4.75000E1     5              7             25
          Third Quartile =  9.50000E1     8             11             55
     Interquartile Range =  4.75000E1     3              4             30
    Lower Adjacent Value =  1.00000E0     1              1              0
    Upper Adjacent Value =  9.90000E1     9             13             86
          Minor Outliers =  0.00000E0     0              0              0
          Major Outliers =  0.00000E0     0              0              0
      Standard Deviation =  2.82111E1     1.9936         2.83648       20.4118
                Variance =  7.95868E2     3.97445        8.0456       416.641
     Coefficient Of Var. =  4.03196E-1    0.304755       0.312068       0.514603
                     Sum =  1.11950E4  1099           1527           8528
          Sum Of Squares =  9.10639E5  7857          15231         427842
     Sum Of Squared Dev. =  1.27339E5   667.708       1351.66       89577.9
           Second Moment =  7.95868E2     3.97445        8.0456       416.641
            Third Moment = -1.67007E4    -3.61146       -5.5665      -342.072
           Fourth Moment =  1.45293E6    37.9385       149.8         396748
 Coefficient Of Skewness = -7.43830E-1   -0.455792      -0.243918      -0.0402229
 Coefficient Of Kurtosis =  2.29384E0     2.40173        2.31416        2.28555
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 0)
LABEL:    NONE

                                   SUMMARY STATISTICS
                                    post_t1       pre_t2        post_t2
                                 ----------- ------------- -------------
                       Mean =  6.51897E1       43.4894        73.4776
                    Maximum =  1.00000E2       75            100
                    Minimum =  0.00000E0       0               0
                      Range =  1.00000E2       75            100
         Valid Observations =  1.95000E2      141            134
             Missing Values =  1.25000E2      179            186
     Sample Standard Dev. =  2.64778E1       15.0697        20.0157
          Sample Variance =  7.01072E2      227.095        400.627
     Sample Coef. Of Var. =  4.06165E-1       0.346514       0.272405
   Standard Error Of Mean =  1.89611E0        1.26909        1.72909
                     Median =  7.10000E1       44             78
             First Quartile =  5.00000E1       33             64
             Third Quartile =  8.45000E1       54             89
        Interquartile Range =  3.45000E1       21             25
       Lower Adjacent Value =  0.00000E0        9             29
       Upper Adjacent Value =  1.00000E2       75            100
             Minor Outliers =  0.00000E0        1              4
             Major Outliers =  0.00000E0        0              0
         Standard Deviation =  2.64098E1       15.0161        19.9409
                   Variance =  6.97477E2      225.484        397.638
        Coefficient Of Var. =  4.05122E-1       0.345283       0.271387
                        Sum =  1.27120E4     6132           9846
             Sum Of Squares =  9.64700E5   298470         776744
        Sum Of Squared Dev. =  1.36008E5    31793.2        53283.4
              Second Moment =  6.97477E2      225.484        397.638
               Third Moment = -1.81027E4     -573.934     -11423.8
              Fourth Moment =  1.68187E6   138956         886382
    Coefficient Of Skewness = -9.82762E-1     -0.169507      -1.44072
    Coefficient Of Kurtosis =  3.45726E0        2.73305        5.60591
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 0)
ABEL:    NONE

                              SUMMARY STATISTICS

                                comp_1        comp_2          i_r          pc_r
                             ------------  ------------  -----------  -----------
                     Mean =   -16.2903      -25.075        3.57143      4.53061
                  Maximum =   37            31             9            9
                  Minimum =   -56           -60            0            0
                    Range =   93            91             9            9
       Valid Observations =   62            40           294          294
           Missing Values =   258           280           26           26
    Sample Standard Dev. =     19.2978       16.6493       2.59298      1.9457
         Sample Variance =    372.406       277.199        6.72355      3.78575
    Sample Coef. Of Var. =     -1.18462      -0.66398      0.726035     0.429456
  Standard Error Of Mean =      2.45083       2.63249      0.151226     0.113476
                  Median =    -18.5         -28            3            5
          First Quartile =    -32           -32            1            3
          Third Quartile =     0            -20            6            6
     Interquartile Range =    32            12             5            3
    Lower Adjacent Value =    -56           -47            0            0
    Upper Adjacent Value =    37            -12            9            9
          Minor Outliers =     0             2             0            0
          Major Outliers =     0             2             0            0
      Standard Deviation =     19.1416       16.4399       2.58857      1.94239
                Variance =    366.4         270.269        6.70068      3.77287
     Coefficient Of Var. =     -1.17503      -0.655628     0.724799     0.428725
                     Sum =  -1010         -1003         1050         1332
          Sum Of Squares =  39170         35961         5720         7144
     Sum Of Squared Dev. =  22716.8       10810.8       1970         1109.22
           Second Moment =    366.4         270.269        6.70068      3.77287
            Third Moment =   3855.08       7232.54         7.04082      0.579503
           Fourth Moment = 412618        539438           96.1892      33.8411
Coefficient Of Skewness =       0.549669      1.62778      0.405924     0.0790766
Coefficient Of Kurtosis =       3.07353       7.38495      2.14234      2.37739
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 0)
 ABEL:    NONE

                              SUMMARY STATISTICS

                                     ss_r          a_r          to_r          wp_r
                              ------------ ----------- ----------- -----------
                     Mean =      4.14286      4.43197      4.55782      4.68707
                  Maximum =      9            9            9            9
                  Minimum =      0            0            0            0
                    Range =      9            9            9            9
       Valid Observations =    294          294          294          294
           Missing Values =     26           26           26           26
     Sample Standard Dev. =      2.22459      2.02555      2.25243      2.292
          Sample Variance =      4.94881      4.10287      5.07344      5.25328
     Sample Coef. Of Var. =      0.53697      0.457032     0.49419      0.489005
   Standard Error Of Mean =      0.129741     0.118133     0.131364     0.133672
                   Median =      4            5            5            5
           First Quartile =      2            3            3            3
           Third Quartile =      6            6            6            6
      Interquartile Range =      4            3            3            3
     Lower Adjacent Value =      0            0            0            0
     Upper Adjacent Value =      9            9            9            9
           Minor Outliers =      0            0            0            0
           Major Outliers =      0            0            0            0
       Standard Deviation =      2.2208       2.02211      2.2486       2.2881
                 Variance =      4.93197      4.08891      5.05618      5.23541
       Coefficient Of Var. =     0.536056     0.456254     0.493348     0.488173
                      Sum =   1218         1303         1340         1378
           Sum Of Squares =   6496         6977         7594         7998
      Sum Of Squared Dev. =   1450         1202.14      1486.52      1539.21
            Second Moment =      4.93197      4.08891      5.05618      5.23541
             Third Moment =      0.0466472   -1.76385      0.269823    -0.0408765
            Fourth Moment =     53.0969      40.4248      57.0653      61.9925
  Coefficient Of Skewness =      0.00425887  -0.21333      0.0237326   -0.0034123
  Coefficient Of Kurtosis =      2.18287      2.41787      2.23217      2.26171
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 0)
LABEL:    NONE

                                 SUMMARY STATISTICS

                                 c_r         ctl_r         inn_r         com_r
                          ----------- ----------- ----------- -----------
                   Mean =   3.78571     4.86735     3.39116     2.27551
                Maximum =   9           9           9           9
                Minimum =   0           0           0           0
                  Range =   9           9           9           9
     Valid Observations =  294         294         294         294
         Missing Values =   26          26          26          26
   Sample Standard Dev. =   2.40271     1.94447     2.15604     1.96443
        Sample Variance =   5.77304     3.78098     4.64852     3.85899
   Sample Coef. Of Var. =   0.634679    0.399494    0.635784    0.863292
 Standard Error Of Mean =   0.140129    0.113404    0.125743    0.114568
                 Median =   4           5           3           2
         First Quartile =   2           3           2           1
         Third Quartile =   5           6           5           3
    Interquartile Range =   3           3           3           2
   Lower Adjacent Value =   0           0           0           0
   Upper Adjacent Value =   9           9           9           6
         Minor Outliers =   0           0           0          15
         Major Outliers =   0           0           0           0
     Standard Deviation =   2.39862     1.94116     2.15237     1.96109
               Variance =   5.7534      3.76812     4.63271     3.84586
    Coefficient Of Var. =   0.633599    0.398814    0.634702    0.861823
                    Sum = 1113        1431         997         669
        Sum Of Squares = 5905        8073        4743        2653
    Sum Of Squared Dev. = 1691.5      1107.83     1362.02     1130.68
          Second Moment =   5.7534      3.76812     4.63271     3.84586
           Third Moment =   4.80029    -1.56954     3.50721     7.79016
          Fourth Moment =  74.6123     33.2486     48.8178     54.5182
Coefficient Of Skewness =   0.347841   -0.214578    0.35173     1.03289
Coefficient Of Kurtosis =   2.25404     2.34167     2.27462     3.68599
```

```
 FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 0)
LABEL:    NONE

                              SUMMARY STATISTICS

                                    i_s           pc_s            ss_s
                           ------------- ------------- -------------
                   Mean =     32.9829       39.8396        39.0717
                Maximum =    72            79             99
                Minimum =     8             0              9
                  Range =    64            79             90
     Valid Observations =   293           293            293
         Missing Values =    27            27             27
   Sample Standard Dev. =    18.2613       16.8703        16.3466
        Sample Variance =   333.476       284.608        267.211
   Sample Coef. Of Var. =      0.55366       0.423456       0.418374
 Standard Error Of Mean =      1.06684       0.985575       0.954977
                 Median =    29            44             38
         First Quartile =    15            27             23
         Third Quartile =    50            53             52
    Interquartile Range =    35            26             29
    Lower Adjacent Value =    8             0              9
    Upper Adjacent Value =   72            79             74
         Minor Outliers =     0             0              1
         Major Outliers =     0             0              0
     Standard Deviation =    18.2301       16.8415        16.3187
               Variance =   332.338       283.636        266.299
     Coefficient Of Var. =     0.552714      0.422733       0.41766
                    Sum =  9664         11673          11448
         Sum Of Squares = 416122        548153         525318
     Sum Of Squared Dev. = 97374.9       83105.5        78025.5
          Second Moment =   332.338       283.636        266.299
           Third Moment =  2662.96        359.157        568.512
          Fourth Moment = 244094        194122         184820
 Coefficient Of Skewness =      0.439536      0.0751867      0.130824
 Coefficient Of Kurtosis =      2.21003       2.41296        2.60622
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 0)
 ABEL:     NONE

                              SUMMARY STATISTICS

                                       a_s            to_s            wp_s
                             -------------  --------------  --------------
                     Mean =     40.9522         39.5768         51.9693
                  Maximum =     78              74              83
                  Minimum =      5               4               4
                    Range =     73              70              79
       Valid Observations =    293             293             293
           Missing Values =     27              27              27
     Sample Standard Dev. =     16.6722         17.4096         16.8459
          Sample Variance =    277.963         303.094         283.783
     Sample Coef. Of Var. =      0.407114        0.439894        0.32415
   Standard Error Of Mean =      0.974002        1.01708         0.984146
                   Median =     46              43              54
           First Quartile =     29              28              40
           Third Quartile =     54              51              62
      Interquartile Range =     25              23              22
     Lower Adjacent Value =      5               4              18
     Upper Adjacent Value =     78              74              83
           Minor Outliers =      0               0               1
           Major Outliers =      0               0               0
       Standard Deviation =     16.6438         17.3799         16.8171
                 Variance =    277.015         302.06          282.815
      Coefficient Of Var. =      0.406419        0.439143        0.323597
                      Sum =  11999           11596           15227
           Sum Of Squares = 572551          547436          874201
      Sum Of Squared Dev. =  81165.3         88503.5         82864.7
            Second Moment =    277.015         302.06          282.815
             Third Moment =   -947.861          98.6159       -330.283
            Fourth Moment = 179592          204602          188635
  Coefficient Of Skewness =     -0.205584        0.0187848      -0.0694438
  Coefficient Of Kurtosis =      2.34035         2.24246         2.3584
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 0)
 ABEL:    NONE

                              SUMMARY STATISTICS

                                       c_s          ctl_s          inn_s
                               ------------- ------------- -------------
                      Mean =     35.942         49.8191        43.3584
                   Maximum =     76             81             80
                   Minimum =      7             13             21
                     Range =     69             68             59
        Valid Observations =    293            293            293
            Missing Values =     27             27             27
     Sample Standard Dev. =      18.6764        14.6294        14.0165
          Sample Variance =     348.808        214.019        196.464
     Sample Coef. Of Var. =        0.519627       0.29365        0.323272
   Standard Error Of Mean =       1.09109        0.854657       0.818855
                   Median =     38             51             41
           First Quartile =     22             36             34
           Third Quartile =     45             58             54
      Interquartile Range =     23             22             20
     Lower Adjacent Value =      7             13             21
     Upper Adjacent Value =     76             81             80
           Minor Outliers =      0              0              0
           Major Outliers =      0              0              0
       Standard Deviation =     18.6445        14.6044        13.9926
                 Variance =    347.618        213.288        195.793
     Coefficient Of Var. =         0.518739       0.293148       0.32272
                      Sum =  10531          14597          12704
           Sum Of Squares = 480357         789703         608192
     Sum Of Squared Dev. = 101852          62493.4        57367.4
            Second Moment =    347.618        213.288        195.793
             Third Moment =   2289.5         -659.681        944.337
            Fourth Moment = 270963         106069          87575.2
  Coefficient Of Skewness =        0.353254      -0.211779       0.344692
  Coefficient Of Kurtosis =        2.24236        2.33161        2.28448
 FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 0)
LABEL:    NONE

                                    SUMMARY STATISTICS

                                  com_s         i_r2         pc_r2         ss_r2
                            ------------- ----------- ------------ -----------
                    Mean =      30.1945      3.79042      4.55689      3.88024
                 Maximum =     80           50           44           31
                 Minimum =      0            0            0            0
                   Range =     80           50           44           31
      Valid Observations =    293          167          167          167
          Missing Values =     27          153          153          153
    Sample Standard Dev. =      14.9249      4.45166      3.64643      3.0945
         Sample Variance =     222.753      19.8173      13.2964       9.57593
    Sample Coef. Of Var. =       0.494292    1.17445      0.800202     0.797502
  Standard Error Of Mean =       0.871923    0.34448      0.282169     0.23946
                  Median =     29            4            4            4
          First Quartile =     21            1            3            2
          Third Quartile =     36            5            6            5
     Interquartile Range =     15            4            3            3
    Lower Adjacent Value =      0            0            0            0
    Upper Adjacent Value =     58            9            9            9
          Minor Outliers =     15            0            0            0
          Major Outliers =      0            1            1            1
      Standard Deviation =      14.8994      4.43831      3.63549      3.08522
                Variance =     221.993      19.6986      13.2168       9.51859
     Coefficient Of Var. =       0.493448    1.17093      0.797802     0.795111
                     Sum =   8847          633          761          648
          Sum Of Squares = 332175         5689         5675         4104
     Sum Of Squared Dev. =  65043.9       3289.66      2207.21      1589.6
           Second Moment =     221.993      19.6986      13.2168       9.51859
            Third Moment =    2986.16      591.706      366.363      120.607
           Fourth Moment = 176272        27395.6      14531.2       3295.64
 Coefficient Of Skewness =       0.902828    6.76789      7.62467      4.1069
 Coefficient Of Kurtosis =       3.57688    70.601       83.1857      36.3743
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 0)
LABEL:     NONE

                                    SUMMARY STATISTICS

                                  a_r2          to_r2          wp_r2         c_r2
                             ------------ ------------ ------------ -----------
                      Mean =      4.8503       4.88623       5.0479      3.62275
                   Maximum =   46           51            54            22
                   Minimum =    0            0             0             0
                     Range =   46           51            54            22
        Valid Observations =  167          167           167           167
            Missing Values =  153          153           153           153
     Sample Standard Dev. =      3.81915      4.27295      4.4272        2.75641
          Sample Variance =    14.5859      18.2581      19.6001        7.59779
     Sample Coef. Of Var. =      0.787405     0.874488     0.877037      0.76086
   Standard Error Of Mean =      0.295535     0.33065      0.342587      0.213297
                    Median =    5            5             5             3
            First Quartile =    3            3             3             2
            Third Quartile =    6            7             7             5
       Interquartile Range =    3            4             4             3
      Lower Adjacent Value =    0            0             0             0
      Upper Adjacent Value =    9            9             9             9
            Minor Outliers =    0            0             0             0
            Major Outliers =    1            1             1             1
        Standard Deviation =     3.8077       4.26013      4.41393       2.74814
                  Variance =    14.4985      18.1487      19.4827        7.5523
        Coefficient Of Var. =     0.785043     0.871865     0.874407      0.758579
                       Sum =  810          816           843           605
            Sum Of Squares = 6350         7018          7509          3453
      Sum Of Squared Dev. = 2421.26       3030.84       3253.62       1261.23
             Second Moment =    14.4985      18.1487      19.4827        7.5523
              Third Moment =  413.215      581.471      697.344       40.7386
             Fourth Moment = 17217.4      27140.9      34443          748.568
 Coefficient Of Skewness =     7.48496      7.52071      8.10909      1.96285
 Coefficient Of Kurtosis =    81.9064      82.4008      90.7405      13.1242
 FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 0)
 LABEL:    NONE

                               SUMMARY STATISTICS

                              ctl_r2       inn_r2       com_r2         i_s2
                         ------------ ------------ ------------ -------------
                  Mean =     5.02994      4.01198      2.33533       32.497
               Maximum =    51           67           58            72
               Minimum =     0            0            0             8
                 Range =    51           67           58            64
    Valid Observations =   167          167          167           165
        Missing Values =   153          153          153           155
  Sample Standard Dev. =     4.14849      5.37956      4.79157      18.4928
       Sample Variance =    17.2099      28.9396      22.9592      341.983
  Sample Coef. Of Var. =     0.824759     1.34087      2.05178       0.569062
Standard Error Of Mean =     0.32102      0.416282     0.370783      1.43966
                Median =     5            3            1            29
        First Quartile =     3            2            0            15
        Third Quartile =     6            5            3            43
   Interquartile Range =     3            3            3            28
  Lower Adjacent Value =     0            0       ************       8
  Upper Adjacent Value =     9            9            7            72
        Minor Outliers =     0            0            5             0
        Major Outliers =     1            1            1             0
    Standard Deviation =     4.13605      5.36342      4.7772       18.4367
              Variance =    17.1069      28.7663      22.8217      339.911
    Coefficient Of Var. =    0.822286     1.33685      2.04562       0.567335
                   Sum =   840          670          390          5362
        Sum Of Squares =  7082         7492         4722        230334
    Sum Of Squared Dev. =  2856.85      4803.98      3811.22     56085.2
         Second Moment =    17.1069      28.7663      22.8217      339.911
          Third Moment =   576.936     1493.84      1038.84       2537.2
         Fourth Moment = 26791.7      94309.2      57549.6      245886
Coefficient Of Skewness =    8.15401      9.68228      9.52852       0.404862
Coefficient Of Kurtosis =   91.55       113.969      110.496         2.12816
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 0)
LABEL:    NONE

                              SUMMARY STATISTICS

                                  pc_s2         ss_s2          a_s2
                            ------------- ------------- -------------
                    Mean =    38            35.7758       42.2727
                 Maximum =    79            74            78
                 Minimum =    0             9             5
                   Range =    79            65            73
      Valid Observations =    165           165           165
          Missing Values =    155           155           155
    Sample Standard Dev. =    17.1589       16.5674       17.1775
         Sample Variance =    294.427       274.48        295.065
    Sample Coef. Of Var. =    0.451549      0.463091      0.406349
  Standard Error Of Mean =    1.33582       1.28977       1.33726
                  Median =    35            38            41
          First Quartile =    27            23            29
          Third Quartile =    53            45            54
     Interquartile Range =    26            22            25
    Lower Adjacent Value =    0             9             5
    Upper Adjacent Value =    79            74            78
          Minor Outliers =    0             0             0
          Major Outliers =    0             0             0
      Standard Deviation =    17.1068       16.5172       17.1253
                Variance =    292.642       272.816       293.277
     Coefficient Of Var. =    0.450179      0.461686      0.405115
                     Sum =    6270          5903          6975
          Sum Of Squares = 286546        256199        343243
     Sum Of Squared Dev. =  48286          45014.7       48390.7
           Second Moment =    292.642       272.816       293.277
            Third Moment =    1130.07       1455.54       -329.592
           Fourth Moment = 222821        164712        206282
 Coefficient Of Skewness =    0.225736      0.323011      -0.0656236
 Coefficient Of Kurtosis =    2.60185       2.21302       2.39831
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 0)
LABEL:    NONE

                              SUMMARY STATISTICS

                                      to_s2         wp_s2          c_s2
                              ------------- ------------- -------------
                       Mean =       46.5758       46.1939       33.5091
                    Maximum =      83            83            76
                    Minimum =       4             4             7
                      Range =      79            79            69
         Valid Observations =     165           165           165
             Missing Values =     155           155           155
       Sample Standard Dev. =       18.6021       18.1571       18.4125
            Sample Variance =     346.038       329.682       339.02
       Sample Coef. Of Var. =        0.399395      0.393063      0.549477
     Standard Error Of Mean =        1.44817       1.41353       1.43341
                     Median =      47            47            30
             First Quartile =      33            33            14
             Third Quartile =      62            59            45
        Interquartile Range =      29            26            31
       Lower Adjacent Value =       4             4             7
       Upper Adjacent Value =      83            83            76
             Minor Outliers =       0             0             0
             Major Outliers =       0             0             0
         Standard Deviation =       18.5457       18.102        18.3566
                   Variance =     343.941       327.684       336.965
         Coefficient Of Var. =       0.398183      0.39187       0.54781
                        Sum =    7685          7622          5529
             Sum Of Squares = 414685        406158        240871
       Sum Of Squared Dev. =   56750.3       54067.8       55599.2
              Second Moment =     343.941       327.684       336.965
               Third Moment =    -486.75      -1501.85       2818.43
              Fourth Moment = 266354        256506        253058
    Coefficient Of Skewness =      -0.0763097    -0.253188      0.455649
    Coefficient Of Kurtosis =       2.2516        2.38885       2.2287
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 0)
LABEL:    NONE

                                 SUMMARY STATISTICS

                                  ctl_s2        inn_s2        com_s2
                              ------------- ------------- -------------
                      Mean =     48.8182       44.7394       27.9879
                   Maximum =     81            80            73
                   Minimum =     13            21            12
                     Range =     68            59            61
        Valid Observations =    165           165           165
            Missing Values =    155           155           155
     Sample Standard Dev. =      15.8485       14.4732       15.4427
          Sample Variance =     251.174       209.474       238.475
     Sample Coef. Of Var. =        0.324643      0.323501      0.551762
   Standard Error Of Mean =        1.2338        1.12674       1.20221
                   Median =      51            41            21
           First Quartile =      36            34            12
           Third Quartile =      58            54            36
      Interquartile Range =      22            20            24
     Lower Adjacent Value =      13            21       *************
     Upper Adjacent Value =      81            80            66
           Minor Outliers =       0             0             4
           Major Outliers =       0             0             0
       Standard Deviation =      15.8004       14.4293       15.3958
                 Variance =     249.652       208.205       237.03
       Coefficient Of Var. =       0.323658      0.322519      0.550088
                      Sum =   8055          7382          4618
           Sum Of Squares = 434423        364620        168358
       Sum Of Squared Dev. =  41192.5       34353.8       39110
            Second Moment =     249.652       208.205       237.03
             Third Moment =    -467.057       878.135      3759.7
            Fourth Moment = 151999         95569.2      195490
  Coefficient Of Skewness =      -0.118404      0.292298      1.03026
  Coefficient Of Kurtosis =       2.43877       2.20463       3.4795
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 155)
LABEL:   NONE

                   HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                             X = r_ss          764.66
                             Y = r_ss2         767.42

         MEAN OF DIFFERENCES  =    -9.52727
             SAMPLE VARIANCE  =  4495.81
                 SAMPLE SIZE  =   165

                           t  =   -1.82518
                       D. F.  =  164
                     P-VALUE  =    0.0697927
                   P-VALUE/2  =    0.0348963
                   SD. ERROR  =    5.2199
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 163)
 ABEL:    NONE

                  HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                              X = r-perc
                              Y = r_perc2

       MEAN OF DIFFERENCES  =   -7.18471
           SAMPLE VARIANCE  =  276.69
               SAMPLE SIZE  =  157

                         t  =  -5.41206E0
                     D. F.  =   1.56000E2
                   P-VALUE  =   2.30597E-7
                 P-VALUE/2  =   1.15299E-7
                 SD. ERROR  =   1.32754E0
```

73.08
75.94

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 158)
LABEL:   NONE

                 HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                              X = r_stan          6.61
                              Y = r_stan2         6.86

      MEAN OF DIFFERENCES  =   -0.580247
          SAMPLE VARIANCE  =    1.56184
              SAMPLE SIZE  =  162

                        t  =  -5.90951E0
                    D. F.  =   1.61000E2
                  P-VALUE  =   1.98401E-8
                P-VALUE/2  =   9.92005E-9
                SD. ERROR  =   9.81886E-2
```

```
 FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 156)
 LABEL:   NONE

                  HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                           X = r_ge            9.76
                           Y = r_ge2           9.88

       MEAN OF DIFFERENCES  =   -0.555488
           SAMPLE VARIANCE  =    3.34175
               SAMPLE SIZE  =  164

                         t  =   -3.89143
                     D. F.  =  163
                   P-VALUE  =    0.000144962
                 P-VALUE/2  =    0.0000724811
                 SD. ERROR  =    0.142746
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 152)
LABEL:   NONE
--------------------------------------------------------------------------------
                  HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                           X = m_ss
                           Y = m_ss2

          MEAN OF DIFFERENCES  =   -12.4167
              SAMPLE VARIANCE  =  1202.32
                  SAMPLE SIZE  =    168

                            t  =   -4.64141
                        D. F.  =  167
                      P-VALUE  =     0.00000696697
                    P-VALUE/2  =     0.00000348348
                    SD. ERROR  =     2.67519
```

765.03

771.66

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 160)
LABEL:   NONE

              HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                         X = m_perc
                         Y = m_perc2

     MEAN OF DIFFERENCES  =   -6.18125
         SAMPLE VARIANCE  =  385.709
             SAMPLE SIZE  =  160

                       t  =   -3.98113
                   D. F.  =  159
                 P-VALUE  =    0.000104078
               P-VALUE/2  =    0.000052039
               SD. ERROR  =    1.55264
```

66.71
70.01

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 153)
LABEL:   NONE

                 HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                          X = m_stan
                          Y = m_stan2

       MEAN OF DIFFERENCES  =   -0.532934
           SAMPLE VARIANCE  =    2.23837
               SAMPLE SIZE  =  167

                         t  =   -4.60327
                     D. F.  =  166
                   P-VALUE  =    0.00000823155
                 P-VALUE/2  =    0.00000411578
                 SD. ERROR  =    0.115773
```

6.19
6.54

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 152)
LABEL:   NONE
```

```
                 HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                          X = m_ge                8.63
                          Y = m_ge2               9.09

      MEAN OF DIFFERENCES  =   -0.756548
          SAMPLE VARIANCE  =    3.48127
              SAMPLE SIZE  =  168

                        t  =  -5.25559E0
                    D. F.  =   1.67000E2
                  P-VALUE  =   4.45639E-7
                P-VALUE/2  =   2.22819E-7
                SD. ERROR  =   1.43951E-1
```

```
 FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 297)
LABEL:   NONE

                 HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                          X = tals_d             226.00
                          Y = tals_d2            -97.83

      MEAN OF DIFFERENCES =   -0.434783
          SAMPLE VARIANCE =  804.348
              SAMPLE SIZE =   23

                        t =  -0.0735215
                    D. F. =  22
                  P-VALUE =   0.942056
                P-VALUE/2 =   0.471028
                SD. ERROR =   5.91368
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 297)
LABEL:   NONE

                HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                         X = tals_q              297.14
                         Y = tals_q2             307.83

      MEAN OF DIFFERENCES  =   -3.47826
          SAMPLE VARIANCE  =  787.352
              SAMPLE SIZE  =   23

                        t  =  -0.594486
                    D. F.  =  22
                  P-VALUE  =   0.558252
                P-VALUE/2  =   0.279126
                SD. ERROR  =   5.85087
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 125)
LABEL:   NONE

                HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                        X = pre_t1           39.67
                        Y = post_t1          65.19

      MEAN OF DIFFERENCES  =  -24.6872
          SAMPLE VARIANCE  =  291.134
              SAMPLE SIZE  =  195

                        t  =  -2.02042E1
                    D. F.  =   1.94000E2
                  P-VALUE  =   1.32427E-49
                P-VALUE/2  =   6.62133E-50
                SD. ERROR  =   1.22188E0
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 188)
LABEL:   NONE
```

188
132

```
                HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                         X = pre_t2
                         Y = post_t2
```

43.49
73.48

```
     MEAN OF DIFFERENCES  =  -29.447
         SAMPLE VARIANCE  =  204.936
             SAMPLE SIZE  =  132

                       t  =  -2.36330E1
                   D. F.  =   1.31000E2
                 P-VALUE  =   4.40581E-49
               P-VALUE/2  =   2.20290E-49
               SD. ERROR  =   1.24601E0
```

```
 FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 282)
LABEL:   NONE                                             282
                                                          38

              HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                     X = comp_1           -16.27
                     Y = comp_2           -25.08

    MEAN OF DIFFERENCES  =    7.42105
        SAMPLE VARIANCE  =  440.521
            SAMPLE SIZE  =   38

                      t  =   2.17959
                  D. F.  =  37
                P-VALUE  =   0.0357273
              P-VALUE/2  =   0.0178637
              SD. ERROR  =   3.4048
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 161)
LABEL:   NONE

                HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                          X = i_r               3.57
                          Y = i_r2              3.79

      MEAN OF DIFFERENCES  =   -0.0125786
          SAMPLE VARIANCE  =   16.6201
              SAMPLE SIZE  =  159

                        t  =   -0.0389058
                     D. F.  =  158
                  P-VALUE  =    0.969015
                P-VALUE/2  =    0.484507
                SD. ERROR  =    0.323309
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 161)
LABEL:   NONE

                  HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                          X = pc_r
                          Y = pc_r2

     MEAN OF DIFFERENCES  =    0.0440252
         SAMPLE VARIANCE  =   12.9537
             SAMPLE SIZE  =  159

                       t  =    0.154242
                   D. F.  =  158
                 P-VALUE  =    0.877616
               P-VALUE/2  =    0.438808
               SD. ERROR  =    0.28543
```

4.53
4.57

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 161)
LABEL:   NONE

             HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                         X = ss_r              4.14
                         Y = ss_r2             3.88

     MEAN OF DIFFERENCES  =    0.232704
         SAMPLE VARIANCE  =    8.52146
             SAMPLE SIZE  =  159

                       t  =    1.00519
                   D. F.  =  158
                 P-VALUE  =    0.316344
               P-VALUE/2  =    0.158172
               SD. ERROR  =    0.231504
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 161)
LABEL:   NONE

           HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                      X = a_r
                      Y = a_r2

    MEAN OF DIFFERENCES  =   -0.327044
        SAMPLE VARIANCE  =   14.4873
            SAMPLE SIZE  =  159

                      t  =   -1.08346
                  D. F.  =  158
                P-VALUE  =    0.280257
              P-VALUE/2  =    0.140128
              SD. ERROR  =    0.301853
```

4.43
4.85

```
--------------------------------------------------------------------------------
 FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 161)
 LABEL:   NONE
--------------------------------------------------------------------------------
                 HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                               X = to_r
                               Y = to_r2

           MEAN OF DIFFERENCES  =   -0.446541
               SAMPLE VARIANCE  =   17.4259
                   SAMPLE SIZE  =  159

                             t  =   -1.34884
                         D. F.  =  158
                       P-VALUE  =     0.179317
                     P-VALUE/2  =     0.0896585
                     SD. ERROR  =     0.331054
```

4.56
4.89

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 161)
LABEL:   NONE

                  HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                           X = wp_r                 4.69
                           Y = wp_r2                5.05

        MEAN OF DIFFERENCES  =   -0.578616
            SAMPLE VARIANCE  =   19.2454
                SAMPLE SIZE  =  159

                          t  =   -1.66313
                      D. F.  =  158
                    P-VALUE  =    0.0982687
                  P-VALUE/2  =    0.0491343
                  SD. ERROR  =    0.347908
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 161)
LABEL:   NONE

                    HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                            X = c_r               3.79
                            Y = c_r2              3.62

       MEAN OF DIFFERENCES  =    0.18239
           SAMPLE VARIANCE  =    6.12475
               SAMPLE SIZE  =  159

                         t  =    0.929298
                     D. F.  =  158
                   P-VALUE  =    0.354152
                 P-VALUE/2  =    0.177076
                 SD. ERROR  =    0.196266
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 161)
LABEL:    NONE
```

```
                  HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                            X = ctl_r
                            Y = ctl_r2

       MEAN OF DIFFERENCES  =   -0.421384
           SAMPLE VARIANCE  =   17.815
               SAMPLE SIZE  =  159

                         t  =   -1.25888
                     D. F.  =  158
                   P-VALUE  =    0.209931
                 P-VALUE/2  =    0.104966
                 SD. ERROR  =    0.33473
```

4.07
3.62

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 161)
LABEL:   NONE

                  HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                          X = inn_r
                          Y = inn_r2

      MEAN OF DIFFERENCES  =   -0.515723
          SAMPLE VARIANCE  =   26.4032
              SAMPLE SIZE  =  159

                        t  =   -1.26557
                    D. F.  =  158
                  P-VALUE  =    0.20753
                P-VALUE/2  =    0.103765
                SD. ERROR  =    0.407502
```

3.39
4.01

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 161)
LABEL:   NONE

                    HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                              X = com_r            2.28
                              Y = com_r2           2.34

          MEAN OF DIFFERENCES  =   -0.113208
              SAMPLE VARIANCE  =   20.2403
                  SAMPLE SIZE  =  159

                            t  =   -0.317297
                        D. F.  =  158
                      P-VALUE  =    0.751437
                    P-VALUE/2  =    0.375719
                    SD. ERROR  =    0.356787
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 164)
ABEL:   NONE
```

```
                    HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                            X = i_s                 32.98
                            Y = i_s2                32.50

     MEAN OF DIFFERENCES  =    2.09615
         SAMPLE VARIANCE  =  209.042
             SAMPLE SIZE  =  156

                       t  =    1.81079
                   D. F.  =  155
                 P-VALUE  =    0.0721097
               P-VALUE/2  =    0.0360548
               SD. ERROR  =    1.15759
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 164)
 ABEL:   NONE

              HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                            X = pc_s             39.84
                            Y = pc_s2            38.00

      MEAN OF DIFFERENCES  =     2.51282
          SAMPLE VARIANCE  =   249.542
              SAMPLE SIZE  =   156

                        t  =     1.98679
                    D. F.  =   155
                  P-VALUE  =     0.0487081
                P-VALUE/2  =     0.024354
                SD. ERROR  =     1.26476
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 164)
LABEL:   NONE

                 HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                          X = ss_s              39.07
                          Y = ss_s2             35.78

      MEAN OF DIFFERENCES  =    3.73718
          SAMPLE VARIANCE  =  212.027
              SAMPLE SIZE  =  156

                        t  =    3.20561
                    D. F.  =  155
                  P-VALUE  =    0.00163691
                P-VALUE/2  =    0.000818454
                SD. ERROR  =    1.16583
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 164)
LABEL:   NONE

                  HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                          X = a_s
                          Y = a_s2

     MEAN OF DIFFERENCES  =   -0.320513
         SAMPLE VARIANCE  =  262.503
             SAMPLE SIZE  =  156

                       t  =   -0.247082
                   D. F.  =  155
                 P-VALUE  =    0.805172
               P-VALUE/2  =    0.402586
               SD. ERROR  =    1.29719
```

41.00
42.27

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 164)
LABEL:   NONE

                 HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                         X = to_s
                         Y = to_s2

      MEAN OF DIFFERENCES  =   -7.85897
          SAMPLE VARIANCE  =  511.425
              SAMPLE SIZE  =  156

                        t  =   -4.34047
                    D. F.  =  155
                  P-VALUE  =    0.0000255503
                P-VALUE/2  =    0.0000127752
                SD. ERROR  =    1.81063
```

39.58
46.58

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 164)
LABEL:   NONE
```

```
                HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                            X = wp_s
                            Y = wp_s2

       MEAN OF DIFFERENCES  =    4.28205
           SAMPLE VARIANCE  =  379.713
               SAMPLE SIZE  =  156

                         t  =    2.74464
                     D. F.  =  155
                   P-VALUE  =    0.00677321
                 P-VALUE/2  =    0.00338661
                 SD. ERROR  =    1.56015
```

52.00
46.19

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 164)
LABEL:   NONE

                 HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                         X = c_s              35.74
                         Y = c_s2             33.51

      MEAN OF DIFFERENCES  =   2.75
          SAMPLE VARIANCE  =  215.156
              SAMPLE SIZE  =  156

                        t  =   2.34163
                    D. F.  =  155
                  P-VALUE  =   0.0204724
                P-VALUE/2  =   0.0102362
                SD. ERROR  =   1.1744
```

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 164)
 ABEL:   NONE

                  HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                              X = ctl_s
                              Y = ctl_s2

      MEAN OF DIFFERENCES  =   -0.801282
          SAMPLE VARIANCE  =  262.986
              SAMPLE SIZE  =  156

                        t  =   -0.617137
                    D. F.  =  155
                  P-VALUE  =    0.53805
                P-VALUE/2  =    0.269025
                SD. ERROR  =    1.29839
```

49.82

48.82

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 164)
LABEL:   NONE

              HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                            X = inn_s
                            Y = inn_s2

       MEAN OF DIFFERENCES  =   -0.628205
           SAMPLE VARIANCE  =  162.7
               SAMPLE SIZE  =  156

                         t  =   -0.615135
                     D. F.  =  155
                   P-VALUE  =    0.539368
                 P-VALUE/2  =    0.269684
                 SD. ERROR  =    1.02125
```

43.36
44.74

```
FILE: NWLPDATA,  NO. OF VARIABLES: 78,  NO. OF CASES: 320 (MISS. CASES: 164)
LABEL:   NONE

              HYPOTHESIS: MEAN X = MEAN Y (Matched Pairs)

                          X = com_s            30.19
                          Y = com_s2           27.99

     MEAN OF DIFFERENCES  =    1.75641
         SAMPLE VARIANCE  =  188.702
             SAMPLE SIZE  =  156

                       t  =    1.59698
                   D. F.  =  155
                 P-VALUE  =    0.112306
               P-VALUE/2  =    0.0561529
               SD. ERROR  =    1.09983
```

EMPLOYEE SUMMARY - SKILL ENHANCEMENT PROGRAM

1. Did you believe that the education classes you attended will somehow help you at your job?

TOTAL	YES	NO	NO RESPONSE
100	81	17	2

2. Should Zircoa continue to maintain a Learning Lab?

TOTAL	YES	NO	NO RESPONSE
100	81	11	8

3. In the 1st semester what was your teacher's name and what was the class?

TOTAL	NO RESPONSE
100	35

TEACHER	CLASS	CONTENT	PRESENTATION	ENTHUSIASM
L. NOTZEN	COMM III	8	8	9
		9	9	9
L. NOTZEN	MATH I	8	9	9
	MATH 11			
M. CANARIO	COMM I	7	7	8
N. HOFFSTADT	MATH II	9	8	9
R. SMITH	COMM I	7	10	10
M. CANARIO	MATH I	8	8	8

4. In the 2nd semester what was your teacher's name and what was the class?

TOTAL	NO RESPONSE
100	30

TEACHER	CLASS	CONTENT	PRESENTATION	ENTHUSIASM
M. CANARIO	MATH II	8	8	8
M. CANARIO	COMM III	8	8	8
K. RUSSELL	COMM III	9	9	9
L. NOTZEN	COMM III	9	7	8
L. BONACCI	COMM II	10	10	10
M. CANARIO	COMM III	8	9	9
L. NOTZEN	COMM II	8	9	9
E..FAIRCHILD	MATH I	8	9	9

5. Was there adequate time allotted for class instruction? i.e., was 2 hours twice a week too much, not enough.

TOTAL	NOT ENOUGH	OK	TOO MUCH	NO RESPONSE
100	27	31	34	8

COMMENTS:
NOT ENOUGH TIME: CLASS SIZE TOO BIG TO COVER MATERIAL WHEN MATERIAL IS NOT FULLY UNDERSTOOD.

TOO MUCH TIME: MATERIAL WAS STRETCHED TO FILL ALLOTTED TIME.

GENERAL COMMENT: MATH WAS "NOT ENOUGH TIME". COMMUNICATIONS WAS "TOO MUCH TIME".

6. What type of "programs" would you like to see in the Learning Lab? Example, metrics, shop floor math, blueprint reading, computer skills, software training, reading skills improvement, etc

TOTAL	NO RESPONSE
100	11

METRICS	14
SHOP FLOOR MATH	20
BLUE PRINT READING	22
COMPUTER SKILLS	65
SOFTWARE TRAINING	49
READING SKILLS IMPROVEMENT	9
NETWORK	2
STATISTICS	2
GRAMMAR	1
ACCOUNTING CLASS	1
CAD/CAM	3
TYPING	4
ALGEBRA I & II	1
LANGUAGE (GERMAN)	1
HYDRAULICS	1
ENGLISH	1
MATH	1
FRACTIONS	1
DECIMALS	1
PERCENTAGE	1
WRITING SKILLS	1
DRAFTING	1
TIME MANAGEMENT	1
STRESS MANAGEMENT	1
MAPICS TRAINING	1
WRITING PROGRAM	1

7. What education programs would be beneficial to you as it relates to your job for the future? Example, Trigonometry, blueprint reading, additional reading skills, problem solving, etc.

TOTAL	NO RESPONSE
100	30

TRIGONOMETRY	5
BLUE PRINT READING	16
ADDITIONAL READING SKILLS	10
PROBLEM SOLVING	25
CHEMISTRY	1
PHASE DIAGRAMS	1
COMPUTER SKILLS	15
SOFTWARE	7
KILN OPERATIONS	1
FIGURE PRESS TONAGE	1
CALCULATE SKRINKAGE	1
HEAT TREATING COURSE	1
VISIT CUSTOMER	1
WRITING	2
EQUIPMENT REPAIR	1
ANALYTICAL GEOMETRY	1
CALCULUS	2
CAD	2
ACCOUNTING COURSES	1
COMMUNICATIONS III OR REPEAT	2
LEGAL CONTRACTS	1
UNDERSTAND QUOTES & C.E.'S	1
UNDERSTANDING CERAMICS	2
TIME MANAGEMENT	2
MULTIPLE PRIORITIES	1
TOTAL QUALITY MAINTENANCE	1
STATISTICS	2
GRAMMAR	1
ADVANCED MATH	1
METRICS	2
STRESS MANAGEMENT	4
ADVANCED SOFTWARE	1
LANGUAGE (GERMAN)	1
MATH	1
FINANCE	1

8. How would you change the educational program to fit your's and Zircoa's needs?

TOTAL	NO RESPONSE
100	56
GEAR PROGRAM TO ON-THE-JOB TRAINING.	19
LESS THAN 4/HRS PER WEEK. (2 HRS)	7
KEEP SAME HIGH LEVEL SUPPORT BY THE COMPANY.	
SHOULD HAVE 100% PARTICIPATION.	
SELECT COURSE TRAINING FROM SUGGESTION LIST.	
UTC CAN'T PROVIDE WHAT I WANT IN TRAINING.	
MAKE COURSES WHAT PEOPLE NEED.	
SIGN UP FOR CLASSES/NOT MANDATORY.	4
MORE MATH DETAIL REQUIRED.	
MORE COMPUTER COURSES.	
ALLOW MORE CLASS TIME.	2
MORE LEARNING LAB TIME.	
BUILD IN A WEEKLY ALLOWANCE OF TIME FOR TRAINING.	
PROBLEM SOLVING-JOB RELATED.	
SEND EMPLOYEES TO OUTSIDE SCHOOLS.	
GROUP EMPLOYEES BY TESTING SO THAT SOME ARE NOT HOLDING THE CLASS UP.	2
MAKE CLASSES ON "NON COMPANY" PAID TIME.	2
DROP IT.	
MORE FLEXIBLE TIMES.	
IN HOUSE TRAINING BETTER THAN OUTSIDE SEMINARS.	
MORE COMMUNICATION CLASSES-THIS HAS BEEN A TOP NEGATIVE ISSUE FOR YEARS.	
WE HAVE NO TOOLS TO WORK WITH IN PACKING.	
OPTIONAL IN THE FUTURE.	
ONLY ALLOW SO MUCH TIME PER YEAR FOR EDUCATION.	
ROLE PLAYING IS USELESS.	
MORE TIME, MORE EFFICIENT SPACE.	
MAKE CLASSES MORE INTERESTING.	
OFFER MORE SUBJECTS.	

9. Were the conference rooms adequate?

TOTAL	YES	NO	NO RESPONSE
100	77	20	3

10. All things considered rate your total learning experience with this Federal Grant:

TOTAL RESPONSE	EXCELLENT	GOOD	FAIR	POOR	NO RESPONSE
100	21	49	24	4	4

11. Any additional comments?

TOTAL RESPONSE	NO RESPONSE
100	67

DON'T STOP THE TRAINING.	2
JOB RELATED....ASKED IF I WOULD LIKE TO PARTICIPATE, I SAID I NEED COMPUTER TRAINING, I GOT COMMUNICATIONS III, WHAT HAPPENED?	
KAREN RUSSELL WAS EXCELLENT INSTRUCTOR.	
THANK YOU FOR CLASSES, HELPED ALOT.	
VERY VERY GOOD.	
MORE CLASSES.	2
ENJOYED CLASSES, VERY INFORMATIVE.	3
TEACHERS ARE PROFESSIONAL.	2
TOO MUCH TIME PER WEEK.	2
HOLD CLASSES ON OFF SHIFT TIMES TOO.	
THANKS FOR THE CLASSES.	6
LIKED THE INSTRUCTORS.	
OFFENSIVE.	
PROGRAM WAS THROWN TOGETHER SO THAT ALL WOULD PARTICIPATE.	
PROGRAM GEARED TO THE LOWEST LEVEL AND WAS BORING TO OTHERS.	
OPTIONAL SIGNUP/SELECTION OF COURSES.	
MORE TIME FOR CLASSES.	
I WORK ALOT DIDN'T HAVE TIME FOR LAB.	
MATH WAS FAIR, COMMUNICATION CLASSES GOOD.	
SELF PACED LEARNING IS BENEFICIAL.	